STILL BOTTOMS POND AREA FINAL ENGINEERED COVER CONSTRUCTION COMPLETION REPORT

AMERICAN CHEMICAL SERVICE, INC.
NPL SITE
GRIFFITH, INDIANA

MWH File No. 2090601

Prepared For:

American Chemical Service NPL Site RD/RA Executive Committee
Griffith, Indiana

Prepared By:

MWH Americas, Inc.
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Chicago, Illinois 60604

April 2005

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Prepared by: _____ APRIL 27, 2005

Robert A. Adams, P.E.
Senior Engineer

Date

Approved by: _____ April 27, 2005

Peter Vagt, Ph.D., CPG
Project Manager

Date

TABLE OF CONTENTS

SECTION **PAGE**

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

ACS	American Chemical Service, Inc.
BWES	Barrier Wall Extraction System
cm/s	centimeters per second
CCR	Construction Completion Report
CQAP	Construction Quality Assurance Plan
GWTP	Groundwater Treatment Plant
ISVE	In-situ Soil Vapor Extraction
MatCon™	Modified Asphalt Technology for Waste Containment
NPL	National Priorities List
PCB	Polychlorinated Biphenyls
PPE	Personal Protective Equipment
PSVP	Performance Standard Verification Plan
QA/QC	*Quality Assurance/Quality Control*
RCRA	Resource Conservation and Recovery Act of 1974
SBPA	Still Bottom Ponds Area
Site	ACS NPL Site
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This Construction Completion Report (CCR) summarizes the installation of the final engineered cover in the Still Bottoms Pond Area (SBPA) of the American Chemical Service, Inc. (ACS) National Priorities List (NPL) Site (Site) in Griffith, Indiana during September 2004. The United States Environmental Protection Agency (U.S. EPA) Consent Decree identification number for the final engineered cover is 5.d.

1.1 OBJECTIVES OF THE STILL BOTTOMS POND AREA ENGINEERED COVER

As outlined in the Final Remedial Design Report (Montgomery Watson, August 1999) the main objectives for the SBPA engineered cover are to:

1. Eliminate potential direct contact with volatile organic compound (VOC) and polychlorinated biphenyl (PCB) contaminated soils;

2. Eliminate potential worker contact with VOC-contaminated groundwater;

3. Reduce the potential for contaminant migration to groundwater by reducing infiltration into this area; and

4. Provide a surface seal for the In-situ Soil Vapor Extraction (ISVE) system to minimize potential short-circuiting and maximize the capture of VOC vapors.

In addition, the final cover in the SBPA will reduce the stormwater infiltration into the dewatering area associated with the SBPA ISVE system. This will reduce the amount of groundwater that needs to be extracted and treated by the groundwater treatment plant (GWTP) during long-term operation of the barrier wall extraction system (BWES).

1.2 DEFINING THE TWO PHASES OF THE SBPA ENGINEERED COVER INSTALLATION PROCESS

There are two Consent Decree components which address the construction of the SBPA Cover: the interim engineered cover (Consent Decree ID 5.c.) and the final cover (Consent Decree ID 5.d.). The installation was divided into these two components so that the ISVE system could be installed and optimized prior to installation of the final cover. The phased approach minimized the potential for damage to the final cover if repairs or modifications of the ISVE system were found to be necessary during the startup phase. The interim engineered cover consists of an initial 12 inches of compacted clay, a geotextile layer, and six to eight inches of compacted gravel. The final engineered cover was constructed on top

of the interim cover and consists of four inches of low-permeability asphalt. As originally planned (and titled), this CCR covers the installation of the final engineered cover in the SBPA. The work that was performed during the construction of the interim cover is discussed in the *Still Bottoms Pond Area Interim Engineered Cover Construction Completion Report* (March 2004).

1.3 MATCON™ TECHNOLOGY

The Modified Asphalt Technology for Waste Containment (MatCon™) system is an advanced modified asphalt technology that combines Wilder Construction Company's proprietary binder with tightly specified aggregates. The benefits of using the MatCon technology are the qualities of low permeability, high strength and resilience, and longevity.

Although MatCon is designed to comply with the RCRA (Resource Conservation and Recovery Act of 1974) permeability requirements with a permeability of <1 x 10-7 centimeters per second (cm/s), the SPBA Final Cover permeability was set at 1 x 10-8 cm/s in order to meet the permeability standard set in the Final Remedy. Additional information on the MatCon asphalt is provided in Appendix H.

1.4 REPORT ORGANIZATION

This report is organized in the five sections summarized below:

- **Section 1: Introduction.** This section summarizes the objectives of the work activities.
- **Section 2: Summary of Cover Installation Activities.** This section summarizes the gravel regrading and compaction, regrading work and concrete placement around the stormwater catch basins, concrete pad placement around the ISVE wells, and the installation of the asphalt cover.
- **Section 3: Material Testing and Quality Confirmation.** This section outlines the material testing and quality confirmation methods employed to verify that the cover conformed to the design requirements. This section also discusses the site surveys that were completed.
- **Section 4: Health and Safety.** This section summarizes the health and safety measures implemented during the project.
- **Section 5: References.** This section lists the documents referred to in the preparation of this report.

2.0 SUMMARY OF COVER INSTALLATION ACTIVITIES

A chronological summary of all the construction activities is included in Appendix A. Annotated photographs of construction activities are included in Appendix B. The site location is shown on Figure 1.

2.1 GRAVEL REGRADING AND COMPACTION

The first step in installing the final cover was to repair areas of erosion damage that had been developing since the Interim cover was installed in May 2003. These areas of erosion damage were regraded and general grading was performed to achieve the final design contours. Once the grading was completed, the entire cover area was compacted using a vibratory smooth drum roller and in-place density testing was then performed at the locations shown on Figure 2. The same locations were tested as for the SBPA interim cover where each six-inch lift was tested at a frequency of eight tests per acre. The in-place density testing on the gravel layer was performed with a nuclear densiometer operating in backscatter mode. The in-place density test results are summarized on Table 1. The final gravel contours are shown on Figure 3.

2.2 CONCRETE PAD INSTALLATION IN THE SBPA

After the gravel subbase was regraded and recompacted, concrete pads were placed around each ISVE stick-up well in the cover area. These pads measured three feet by three feet and were placed as a protection for the wells and so that wells could be removed, if necessary, without damaging the low permeability asphalt. Several concrete pads had been constructed prior to the final cover work around flushmount ISVE wells and air sparge points. These previously constructed concrete pads measured five feet by five feet.

2.3 ASPHALT INSTALLATION

On September 7, 2004, Walsh and Kelly installed a pavement test pad at the Griffith-Merrillville Airport located in Griffith, Indiana. The 20-foot x 200-foot test pad was placed and compacted with a total depth of four inches. The test pad was constructed in order to familiarize the paving crew with the MatCon materials, to evaluate the proposed asphalt placement and compaction procedures, to assess and calibrate density gauges and measurement procedures, and confirm that the design parameters could reliably be produced in the field. Based on the results of the test pad construction and quality assurance/quality control (QA/QC) testing, it was determined by the independent QC contractor hired by Wilder Engineering that placement of the asphalt cover in the SBPA could proceed the following day. The QC contractor was Geoffrey Rowe of Abatech Inc.

On September 8, 2004, Walsh and Kelly began installing the asphalt cover in the SBPA. Prior to applying the MatCon on September 8th, a herbicide was sprayed on the gravel layer to inhibit weed growth. The asphalt cover installation was completed on September 10, 2004. The cover was placed using a Blaw Knox PF5510 Rubber Track paver. The versatility of the paver allowed it to maneuver around the numerous cover penetrations (concrete pads, ISVE blower building, ACS pipe racks, etc.). The asphalt was transferred and placed with hand tools by Walsh and Kelly personnel in tight or sloped areas that the paver could not easily access. Exposed asphalt edges at which adjacent asphalt was not placed within one hour were considered cold joints. During installation of the SBPA final cover cold joints only occurred at the beginning of each workday after the first day. To enhance the seal of these seams, the procedure at the beginning of each day was to roughen the cold joint with a grinder and apply a special proprietary sealant. This was done to create a strong seal, called a cold joint seal, between the asphalt to be placed on that day and the asphalt that was placed on the previous day. Photos showing the placement of the asphalt cover are provided in Appendix B of this report.

During construction of the final cover the cover was divided into 71 individual control areas, with no area exceeding 2,000 square foot in size, and five in-place density tests were conducted within each control area. The five tests were then used to establish an average density for each control area. The density of the MatCon asphalt was determined using a TransTech Systems, Inc. Pavement Quality Indicator, which uses electrical waves to measure the asphalt's density and the air void content. The unit was calibrated and used by the operator in accordance with the manufacturer's instructions.

The permeability and density of the asphalt were correlated by comparing in-place density/air void results collected with the Pavement Quality Indicator to laboratory test results of a core sample collected from the same area. Comparison of data from the seven test locations on the test pad indicated what in-place density and air void ratio results would be necessary for the permeability requirements to be met. Abatech provided this relationship in graphical form on Figure 4 of its report (provided in Appendix E). Due to the proprietary nature of other parameters that were tested in the laboratory, the core permeability results could not be provided in this report. The control areas are shown on Figure 5 and average densities are summarized in Table 2. The average permeability for the entire SBPA cover is 1.4×10^{-9} cm/s, which is an acceptable value for the required 1×10^{-8} cm/s.

The average asphalt thickness placed in the SBPA was measured at 4.3 inches. This thickness was estimated based on a total of 2,969 tons of asphalt that were compacted to an average of 2.42 tons per cubic meter over the 2.81-acre site. The depth of the asphalt was verified during installation of the cover using a rod. This thickness is within the thickness tolerance of four inches plus or minus one-half inch.

Concrete storm water diversion curbs and additional pavement were placed around multiple catch basins around the perimeter of the cover to promote proper drainage off of the cover. Additional pavement was also added around several of the concrete well pads to promote drainage away from these pads. In order to prevent traffic from the ACS facility entering the well fields and potentially damaging wells or conveyance piping or compromising the

integrity of the cover, yellow stripes were painted on the cover to delineate allowable traffic routes. Additionally, yellow chain link fence was installed around both well fields to limit vehicle access.

3.0 MATERIAL TESTING AND QUALITY CONFIRMATION

Material testing and quality confirmation was conducted in accordance with the *Construction Quality Assurance Plan* (CQAP) (Montgomery Watson, June 1999), the *Performance Standard Verification Plan* (PSVP) (Montgomery Watson, June 1999), and the *Construction Quality Control Program Plan for MatCon Impermeable Asphalt* (Wilder Construction, August 2004) to confirm that the cover conformed to the design requirements.

3.1 GEOTECHNICAL TESTING AND VISUAL INSPECTION OF PLACED GRAVEL

Prior to the asphalt cover installation, the gravel layer was regraded to repair areas of erosion damage and achieve the final contours. The regraded gravel was then compacted. Midwest Engineering then collected four samples of the in-place gravel to analyze for the Proctor value of the gravel. The average of the four test results was used to verify that the gravel had been compacted to at least 90 percent of the Proctor value. Ninety percent of the Procotor value was considered acceptable for the majority of the cover area because the gravel was considered non-structural. Gravel for structural areas, such as the access road and the blower shed pad, were compacted to 95 percent of the Proctor value. A copy of the geotechnical testing results is included in Appendix C. In-place density tests, performed at a frequency of eight tests per acre, indicated that the gravel was sufficiently compacted. The in-place density test results are summarized in Table 1.

Prior to installing the final cover, representatives from the paving contractor inspected the gravel layer to verify that it was suitable for placement of the asphalt. A copy of the subbase acceptance letter is included in Appendix D.

3.2 GEOTECHNICAL TESTING AND VISUAL INSPECTION OF ASPHALT

During the installation of the test pad, seven core samples were collected. The core samples were analyzed by Wilder Construction to confirm that the asphalt and the installation procedures matched the design. In addition, ten in-place density tests were performed in order to calibrate the in-place density test results with the core permeability results.

During the installation of the asphalt cover in the SBPA, 71 in-place density tests were performed and two core samples were collected. One core sample was collected as a duplicate in case there were problems with the first core sample. The in-place density tests indicated one control area, H1, had a permeability less than the required 1×10^{-8} cm/s. However, the remaining control areas exceeded the permeability requirement with a total cover average of 1.4×10^{-9} cm/s. The locations of the control areas are shown on Figure 5. A copy of the Abatech Group quality control report which includes the asphalt permeability results is included in Appendix E. A copy of the core sample results report is included in Appendix F.

Visual inspection of the cover did not indicate any deficiencies with the placement of the cover.

3.3 SURVEYING

The Site was surveyed after the gravel regrading and compaction was completed and before the placement of the asphalt cover to confirm that the desired final grades had been obtained. Surveying was performed by Torrenga Surveying, LLC and certified by an Indiana-licensed surveyor. A final survey of the SBPA was performed after the completion of the asphalt pavement to verify the thickness of asphalt and document as "as built" conditions. The final tops of asphalt contours are shown on Figure 6.

4.0 HEALTH AND SAFETY

MWH erected a temporary security fence around the work area prior to beginning work activities at the site. This fence was used to restrict the access of unauthorized personnel and to control the flow of work traffic through the site.

Daily health and safety meetings were held at the site during the gravel regrading and compacting and concrete placement activities. A kickoff health and safety meeting for the asphalt pavement project was conducted on September 7, 2004 for the construction workers. The topics of these meetings included but were not limited to potential exposure to contaminants, level of personal protection equipment (PPE) required, cautions for working around heavy equipment, and protocols for communication with other contractors. Copies of daily health and safety tailgate logs are included in Appendix G.

Work throughout the project was conducted in Level D PPE, which included safety shoes, hard hats, and safety glasses. Air monitoring was not conducted during the placement of the asphalt cover because the work area had already been covered with the interim cover, thus minimizing the potential for chemical exposures. The ACS facility requested that Walsh & Kelly personnel drink liquids only in the facility's designated rest and cooling area while on the ACS property.

As an additional safety precaution, the SBPA ISVE system was shut down during the work activities associated with the cover installation.

5.0 REFERENCES

1. *Performance Standard Verification Plan, ACS NPL Site,* Montgomery Watson, June 1999.

2. *Construction Quality Assurance Plan, ACS NPL Site,* Montgomery Watson, June 1999.

3. *Final Remedial Design Report, Final Remedy, ACS NPL Site,* Montgomery Watson, August 1999.

4. *Still Bottoms Pond Area Interim Engineered Cover Construction Completion Report,* MWH, March 2004.

5. *American Chemical Services, Inc. Work Plan,* Walsh and Kelly Paving Contractors, 2004.

6. *Hot Mix Asphalt Quality Control Plan*, Walsh and Kelly Paving Contractors, March 20, 2003.

7. *Construction Quality Control Program Plan for MatCon Impermeable Asphalt*, Wilder Construction Company, August 2004.

8. *Employee Safety and Conduct Manual*, Walsh and Kelly Paving Contractors.

9. *Report on Quality Control Activities, ACS Final Cover Construction*, Abatech Group, October 30, 2004.

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Tables

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Table 1
Gravel Compaction Test Results
SBPA Final Engineered Cover
ACS NPL Site
Griffith, Indiana

Sample Location	Sample Date	Dry Density (pcf)	Moisture (%)	Proctor Value[1] (pcf)	Percent Compaction	Compaction Requirement (Percent of Proctor Value)	Pass/Fail	Northing	Easting
1	8/13/2004	127.8	3.1	129.6	98.1	90	Pass	6912.49	5243.59
2	8/13/2004	123.9	2.8	129.6	95.4	90	Pass	6969.86	5305.81
3	8/13/2004	127.7	3.1	129.6	98.3	90	Pass	7042.80	5364.10
4	8/13/2004	126.7	3.4	129.6	97.7	90	Pass	6849.56	5312.54
5	8/13/2004	119.2	4.4	129.6	91.7	90	Pass	6858.33	5368.96
6	8/13/2004	123.3	3.2	129.6	94.9	90	Pass	6903.61	5390.79
7	8/13/2004	128.6	4.0	129.6	99.0	90	Pass	6974.05	5414.54
8	8/13/2004	126.4	3.2	129.6	97.3	90	Pass	6839.72	5393.25
9	8/13/2004	132.9	3.9	129.6	102.3	90	Pass	6947.96	5460.98
10	8/13/2004	131.8	2.9	129.6	101.5	90	Pass	7020.30	5486.20
11	8/13/2004	136.1	4.1	129.6	104.8	90	Pass	6787.86	5371.91
12	8/13/2004	131.8	4.0	129.6	101.4	90	Pass	6907.05	5462.75
13	8/13/2004	135.5	3.5	129.6	104.3	90	Pass	6803.14	5435.09
14	8/13/2004	128.7	3.7	129.6	99.1	90	Pass	6927.78	5512.30
15	8/13/2004	129.0	3.9	129.6	99.3	90	Pass	6778.26	5474.93
16	8/13/2004	128.2	2.9	129.6	98.7	90	Pass	6853.78	5515.43
17	8/13/2004	120.1	4.0	129.6	92.5	90	Pass	6687.47	5489.40
18	8/13/2004	130.7	3.9	129.6	100.6	90	Pass	6794.90	5552.60
19	8/13/2004	134.2	2.2	129.6	103.2	90	Pass	6916.00	5615.50
20	8/13/2004	130.4	3.5	129.6	100.4	90	Pass	6761.06	5533.75
21	8/13/2004	120.6	3.1	129.6	92.4	90	Pass	6830.73	5601.09
22	8/13/2004	126.6	2.6	129.6	97.5	90	Pass	6714.90	5553.70
23	8/13/2004	121.5	2.8	129.6	93.5	90	Pass	67533.96	5623.63
24	8/13/2004	123.6	4.0	129.6	95.2	90	Pass	6680.92	5603.72
25	8/13/2004	134.6	3.8	129.6	103.6	90	Pass	6784.99	5674.82

Notes:

[1] Proctor value is the average of four samples collected on 8/10/04 from the existing gravel layer.

pcf = pounds per cubic foot

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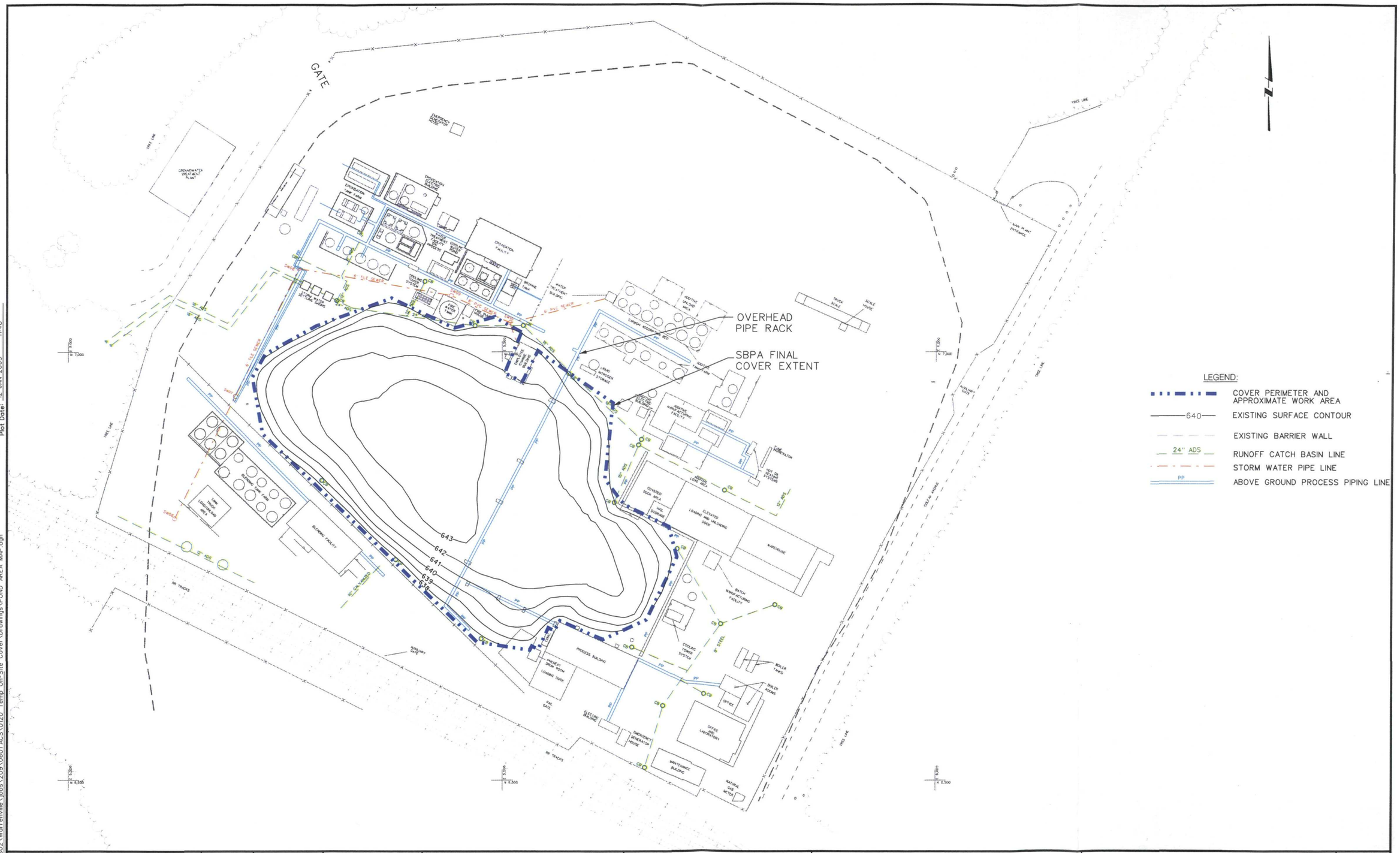
Table 2
Asphalt Pavement Testing Results
SBPA Final Engineered Cover
ACS NPL Site
Griffith, Indiana

Test #	Date Collected	Density (Tons/m^3)	Void Content %	Estimated Permeability (cm/sec)
A1	9/8/2004	2.425	0.7	2.25×10^{-11}
A2	9/8/2004	2.410	1.3	4.88×10^{-10}
A3	9/8/2004	2.423	0.8	3.52×10^{-11}
A4	9/8/2004	2.431	0.4	2.15×10^{-12}
A5	9/8/2004	2.412	1.2	3.75×10^{-10}
B1	9/8/2004	2.423	0.8	3.52×10^{-11}
B2	9/8/2004	2.388	2.2	7.38×10^{-9}
B3	9/8/2004	2.412	1.2	3.75×10^{-10}
B4	9/8/2004	2.404	1.6	1.24×10^{-9}
B5	9/8/2004	2.405	1.5	9.99×10^{-10}
C1	9/8/2004	2.412	1.2	3.75×10^{-10}
C2	9/8/2004	2.418	1.0	1.11×10^{-10}
C3	9/8/2004	2.415	1.1	2.12×10^{-10}
C4	9/8/2004	2.405	1.5	9.99×10^{-10}
C5	9/8/2004	2.393	2.0	4.60×10^{-9}
D1	9/8/2004	2.415	1.4	6.75×10^{-10}
D2	9/8/2004	2.418	1.3	4.08×10^{-10}
D3	9/8/2004	2.401	1.7	1.87×10^{-9}
D4	9/8/2004	2.425	0.7	2.25×10^{-11}
E1	9/8/2004	2.420	0.9	7.80×10^{-11}
E2	9/8/2004	2.420	0.9	7.80×10^{-11}
E3	9/8/2004	2.410	1.3	4.89×10^{-10}
F1	9/9/2004	2.417	1.3	5.28×10^{-10}
F2	9/9/2004	2.409	1.6	1.63×10^{-9}
F3	9/9/2004	2.412	1.5	1.07×10^{-9}
F4	9/9/2004	2.412	1.5	1.07×10^{-9}
G1	9/9/2004	2.412	1.5	1.07×10^{-9}
G2	9/9/2004	2.412	1.5	1.07×10^{-9}
G3	9/9/2004	2.407	1.7	1.98×10^{-9}
G4	9/9/2004	2.399	2.0	4.82×10^{-9}
H1	9/9/2004	2.388	2.5	1.35×10^{-8}
H2	9/9/2004	2.407	1.7	1.98×10^{-9}
H3	9/9/2004	2.409	1.6	1.63×10^{-9}
H4	9/9/2004	2.409	1.6	1.63×10^{-9}
I1	9/9/2004	2.409	1.6	1.63×10^{-9}
I2	9/9/2004	2.413	1.5	8.53×10^{-10}
J1	9/9/2004	2.410	1.6	1.32×10^{-9}
J2	9/9/2004	2.409	1.6	1.63×10^{-9}
J3	9/9/2004	2.410	1.6	1.32×10^{-9}
J4	9/9/2004	2.420	1.2	3.11×10^{-10}
K1	9/9/2004	2.418	1.3	4.08×10^{-10}
K2	9/9/2004	2.421	1.1	2.33×10^{-10}
K3	9/9/2004	2.412	1.5	1.07×10^{-9}
L1	9/9/2004	2.413	1.5	8.53×10^{-10}
L2	9/9/2004	2.417	1.3	5.28×10^{-10}

Table 2
Asphalt Pavement Testing Results
SBPA Final Engineered Cover
ACS NPL Site
Griffith, Indiana

Test #	Date Collected	Density (Tons/m^3)	Void Content %	Estimated Permeability (cm/sec)
M1	9/9/2004	2.413	1.5	8.53×10^{-10}
M2	9/9/2004	2.415	1.4	6.75×10^{-10}
N1	9/10/2004	2.415	1.4	6.75×10^{-10}
N2	9/10/2004	2.420	1.2	3.11×10^{-10}
N3	9/10/2004	2.410	1.6	1.32×10^{-9}
N4	9/10/2004	2.413	1.5	8.53×10^{-10}
N5	9/10/2004	2.409	1.6	1.63×10^{-9}
O1	9/10/2004	2.417	1.3	5.28×10^{-10}
O2	9/10/2004	2.412	1.5	1.07×10^{-9}
O3	9/10/2004	2.409	1.6	1.63×10^{-9}
P1	9/10/2004	2.401	2.0	4.08×10^{-9}
P2	9/10/2004	2.409	1.6	1.63×10^{-9}
P3	9/10/2004	2.401	2.0	4.08×10^{-9}
Q1	9/10/2004	2.409	1.6	1.63×10^{-9}
Q2	9/10/2004	2.415	1.4	6.75×10^{-10}
Q3	9/10/2004	2.413	1.5	8.53×10^{-10}
R1	9/10/2004	2.410	1.6	1.32×10^{-9}
R2	9/10/2004	2.412	1.5	1.07×10^{-9}
S1	9/10/2004	2.412	1.5	1.07×10^{-9}
S2	9/10/2004	2.417	1.3	5.28×10^{-10}
T1	9/10/2004	2.417	1.3	5.28×10^{-10}
T2	9/10/2004	2.409	1.6	1.63×10^{-9}
U1	9/10/2004	2.401	2.0	4.08×10^{-9}
U2	9/10/2004	2.409	1.6	1.63×10^{-9}

Notes:
The estimated permeability values are the average of all 5 density readings taken in the designated test #.
Figure 5 illustrates the location of the asphalt test #s



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FILE: \\Dschl4s02\Warrenville\Jobs\209\0601 ACS\0120 Temp. On-Site Cover\Drawings\POND AREA MAP.dgn

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WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED JDP
DRAWN MTM
CHECKED RAA

SUBMITTED BY

ROBERT A. ADAMS (PROJECT MANAGER) — LICENSE NO. — DATE

PETER VAGT (COMPANY OFFICER) — LICENSE NO. — DATE

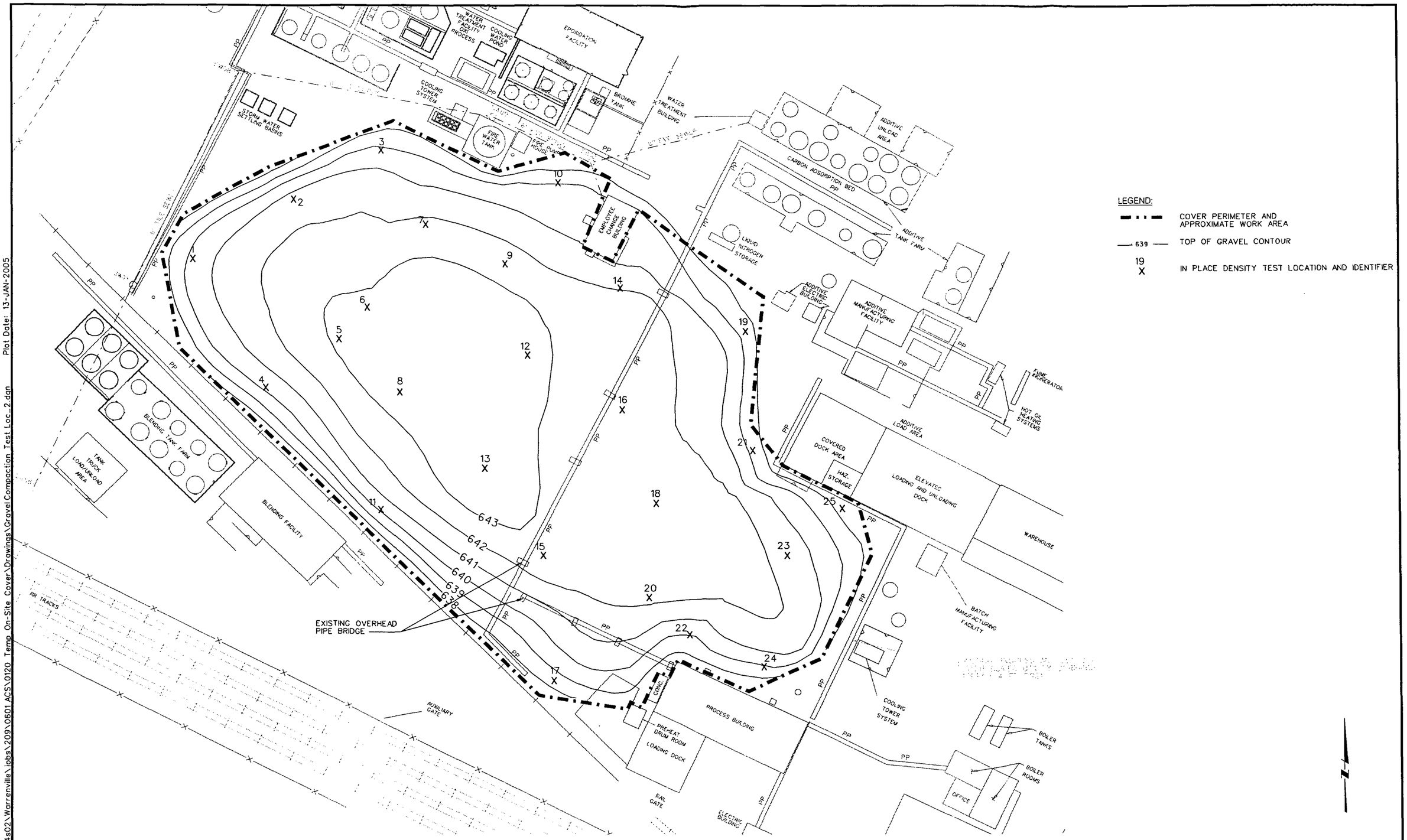
MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

STILL BOTTOMS POND AREA FINAL COVER

STILL BOTTOMS POND AREA LOCATION MAP

FIGURE 1



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SCALE 1"=30'

WARNING 0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED JDP
DRAWN MTM
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE
PETER VAGT (COMPANY OFFICER) LICENSE NO. DATE

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STILL BOTTOMS POND AREA FINAL COVER CCR

GRAVEL COMPACTION TEST LOCATIONS

FIGURE 2

File: \\Uschi4s02\Warrenville\Jobs\209\0601 ACS\0120 Temp On-Site Cover\Drawings\GravelCompaction Test Loc_2.dgn Plot Date: 13-JAN-2005

Plot Date: 13-JAN-2005 10:12

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REV	DATE	BY	DESCRIPTION

SCALE 1"=30'

WARNING 0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED JDP
DRAWN MTM
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE
PETER VAGT (COMPANY OFFICER) LICENSE NO. DATE

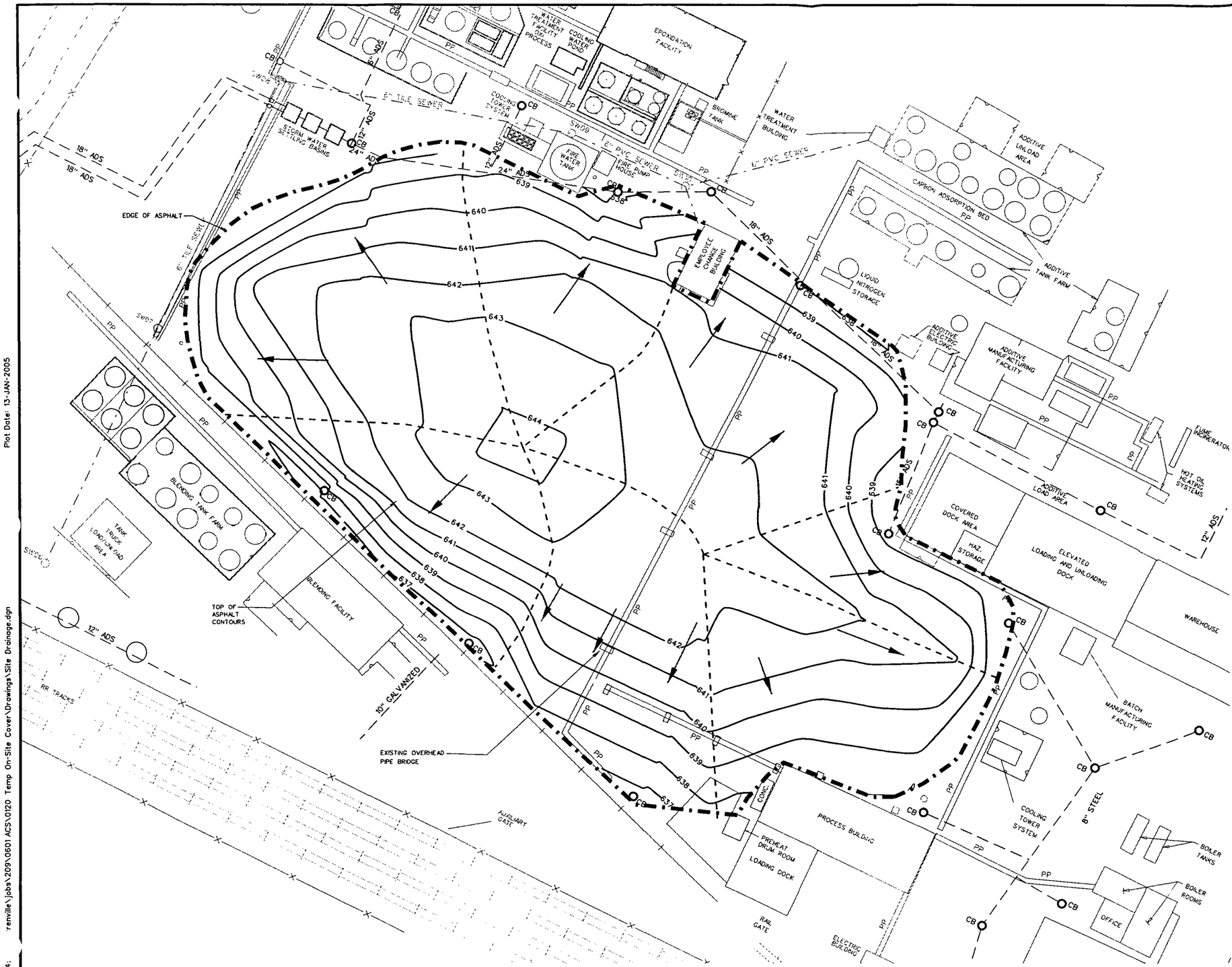
MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

STILL BOTTOMS POND AREA FINAL COVER

TOP OF SUBBASE CONTOURS

FIGURE 3



Plot Date: 13-JAN-2005

File: \\Uschi4:\renville\Jobs\209\0601 ACS\0120 Temp On-Site Cover\Drawings\Site Drainage.dgn

REV	DATE	BY	DESCRIPTION

SCALE: 1"=30'

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED JDP
DRAWN MTM
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE
PETER VAGT (COMPANY OFFICER) LICENSE NO. DATE

MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

STILL BOTTOMS POND AREA FINAL COVER

SITE DRAINAGE MAP

FIGURE 4

NOTE:
CONTROL AREAS ARE ESTIMATED BASED ON QC CONTRACTOR'S PROVIDED INFORMATION

REV	DATE	BY	DESCRIPTION

SCALE 1"=30'

WARNING 0 1/2 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED JDP
DRAWN MTM
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE
PETER VAGT (COMPANY OFFICER) LICENSE NO. DATE

MWH

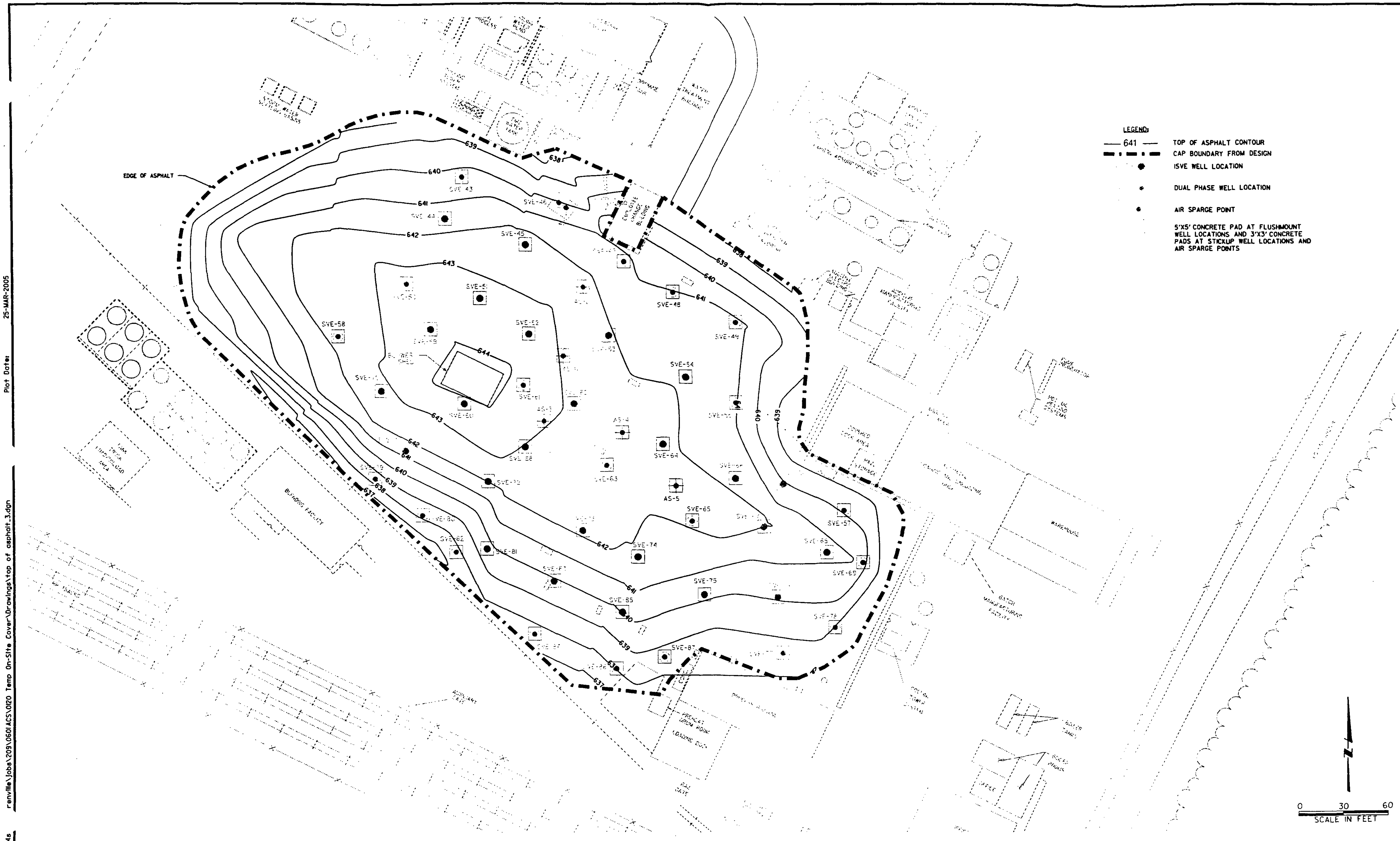
ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

STILL BOTTOMS POND AREA FINAL COVER
IN-PLACE DENSITY TESTING CONROL AREAS

FIGURE 5

Plot Date: 24-JAN-2005 09:33

FILE: \\vch14s02\...ville\Jobs\2093\0601ACS\0120_Temp_On-Site Cover\Drawings\Density Control Areas.dgn



REV	DATE	BY	DESCRIPTION

SCALE 1"=30'

WARNING 0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED JDP
DRAWN MTM
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE
PETER VAGT (COMPANY OFFICER) LICENSE NO. DATE

MWH

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

STILL BOTTOMS POND AREA FINAL COVER

TOP OF ASPHALT COVER CONTOURS

FIGURE 6

APPENDIX A

Chronological Summary of Construction Activities

CHRONOLOGICAL SUMMARY OF CONSTRUCTION ACTIVITIES

This section summarizes the Site activities related to the installation of the final engineered cover in the Still Bottoms Pond Area. Photographs summarizing Site activities are included in Appendix B.

Week of July 19, 2004
Midwest Environmental Services (MES) was onsite regrading the gravel layer for the SBPA final cover. In addition, MES constructed forms around the stick up ISVE wells in preparation of placing concrete pads around these wells.

Week of August 9, 2004
Fine grading of the cover area and gravel compaction testing was conducted. The compaction results met the required 90 percent of the Proctor value.

Week of August 23, 2004
The final concrete pads were installed around the ISVE wells, final grading of the gravel was completed, and MWH and the paving contractors conducted an inspection of the gravel layer.

Week of August 30, 2004
Torrenga Surveying was onsite surveying the gravel layer. Representatives from Wilder Construction and Walsh and Kelly performed a site walk.

Week of September 6, 2004
Walsh and Kelly began the paving process by constructing a pavement test pad at the Griffith, Indiana airport on September 7th. The paving for the SBPA cover was performed on September 8th, 9th, and 10th. Prior to placing the asphalt layer, the gravel layer was sprayed with a herbicide to inhibit the growth of weeds. MWH was present for oversight during all paving activities.

Week of September 13, 2004
Walsh and Kelly returned to site to take core samples from the completed cover.

Week of October 4, 2004
Walsh and Kelly returned to site to perform final touch-ups on the cover. The work included: filling in pavement joints, installing storm water diversion curbs, and placing additional pavement around perimeter catch basins.

Week of October 11, 2004
Walsh and Kelly returned to the site to apply yellow traffic boundary lines to the asphalt.

APPENDIX B

Photographs

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/7/2004

Direction:

Looking North West

Comments:
Photo 1
Compacting pavement where test pad will be placed

Photographer:

Amy Clore

Date:

9/7/2004

Direction:

Looking West

Comments:
Photo 2
Truck loading paver with asphalt

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/7/2004

Direction:

Looking South

Comments:
Photo 3
Paving test pad

Photographer:

Amy Clore

Date:

9/7/2004

Direction:

Looking West

Comments:
Photo 4
Truck reloading paver with asphalt

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

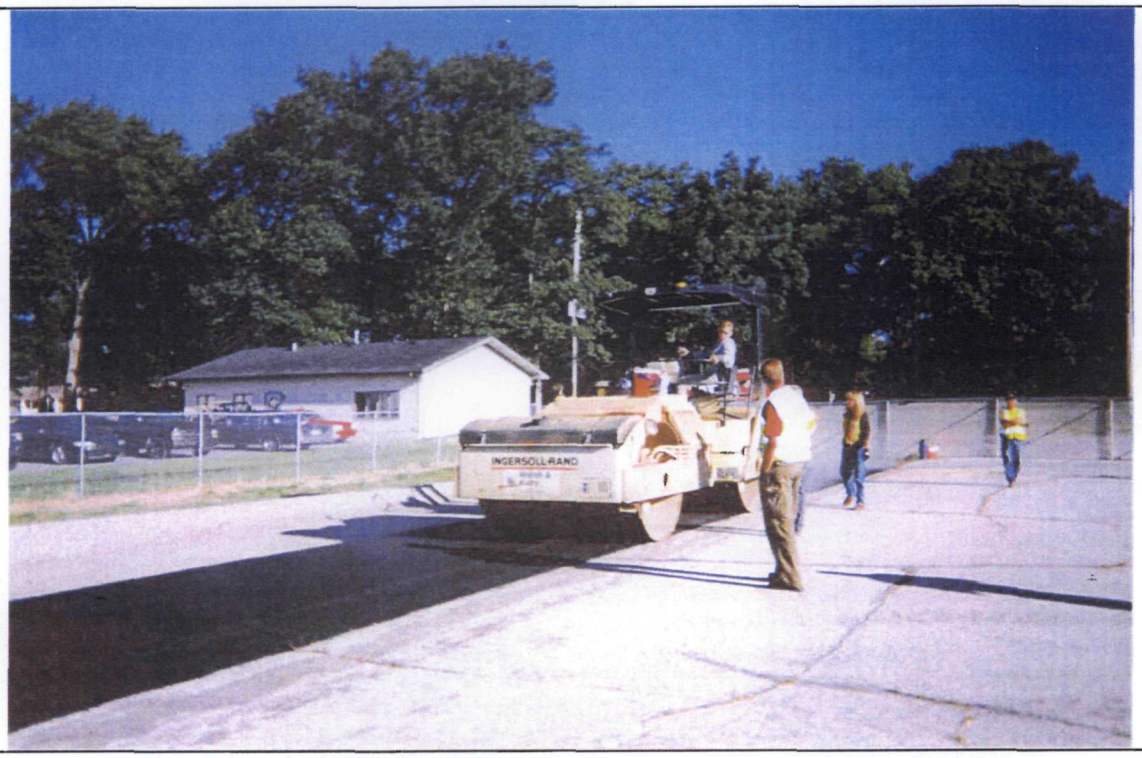
Date:

9/7/2004

Direction:

Looking North West

Comments:
Photo 5
Compacting first strip of test pad



Photographer:

Amy Clore

Date:

9/7/2004

Direction:

Looking West

Comments:
Photo 6
Performing nuclear density tests on test pad

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/7/2004

Direction:

Looking North West

Comments:
Photo 7

Paving second strip of test pad

Photographer:

Amy Clore

Date:

9/7/2004

Direction:

Looking North West

Comments:
Photo 8

Independent QC contractor marking test pad for pavement analysis

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

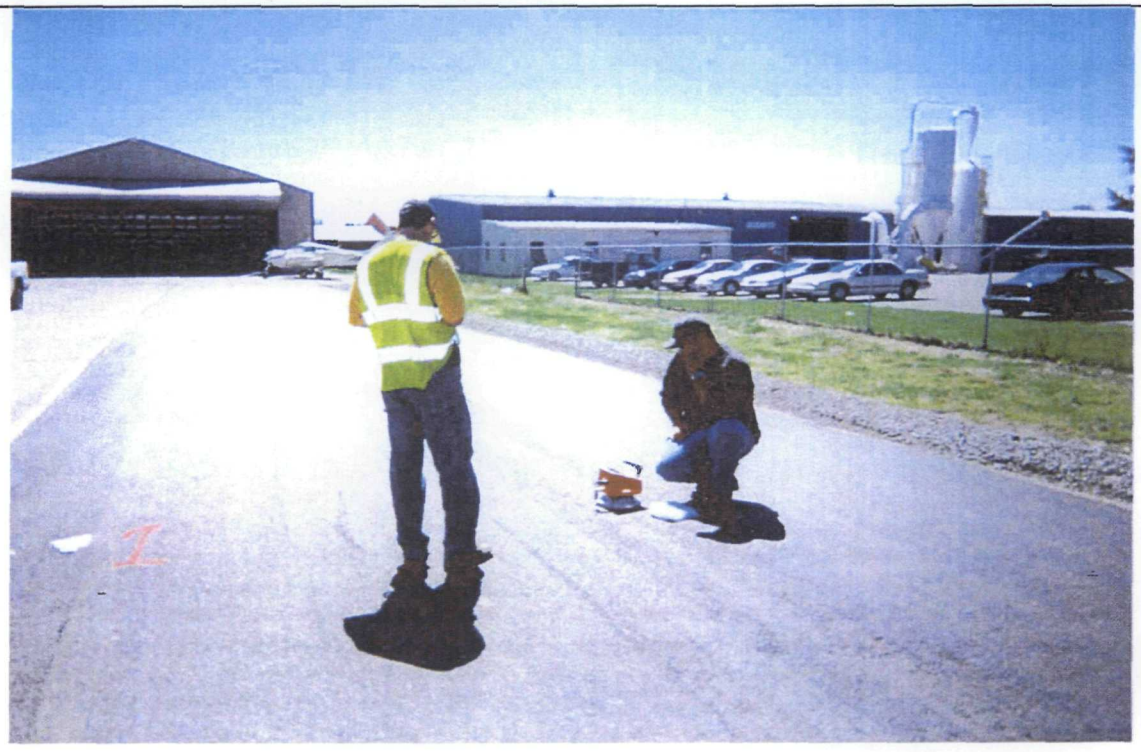
Date:

9/7/2004

Direction:

Looking South

Comments:
Photo 9
Performing in-place density tests on the test pad



Photographer:

Amy Clore

Date:

9/7/2004

Direction:

Looking North

Comments:
Photo 10
Collecting a core sample

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking South East

Comments:
Photo 11
On-Site area prepped for pavement

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking North West

Comments:
Photo 12
Marking cover perimeter (background), line is seen as pink dashed line (foreground)

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking South

Comments:
Photo 13
Spraying sealant tar on concrete SVE well bases

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking East

Comments:
Photo 14
Herbicide application prior to pavement application

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

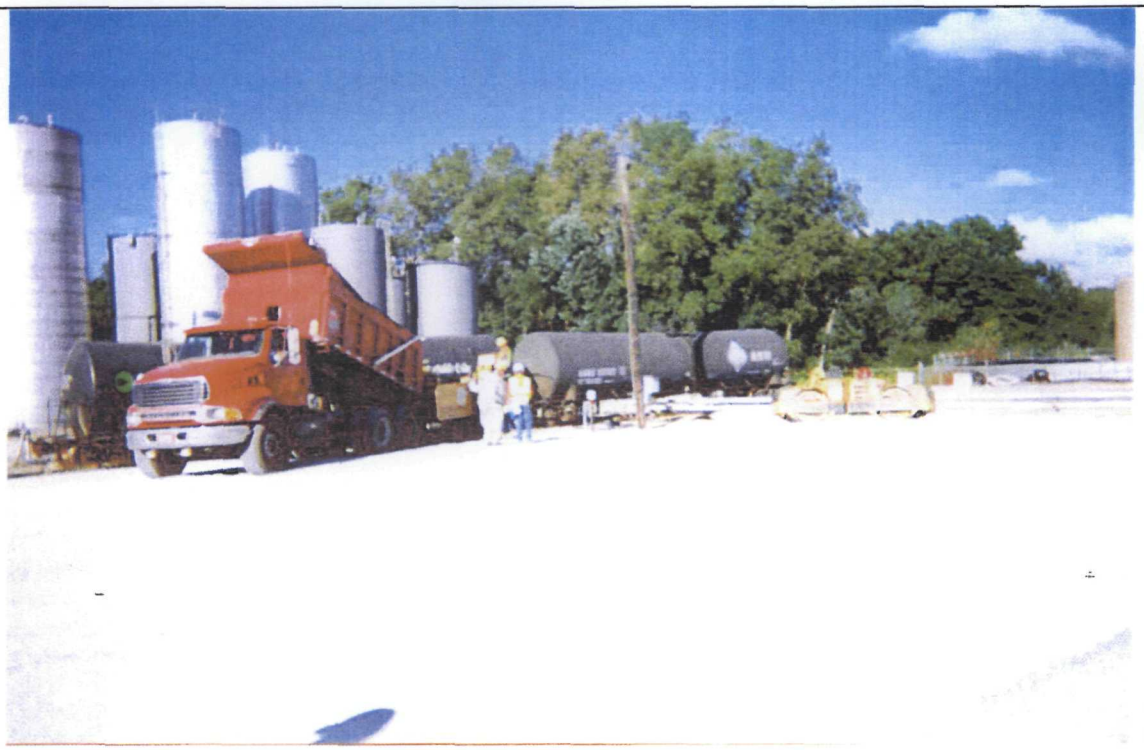
Date:

9/8/2004

Direction:

Looking West

Comments:
Photo 15
First truckload of asphalt loads paver on west side of On-Site cover



Photographer:

Amy Clore

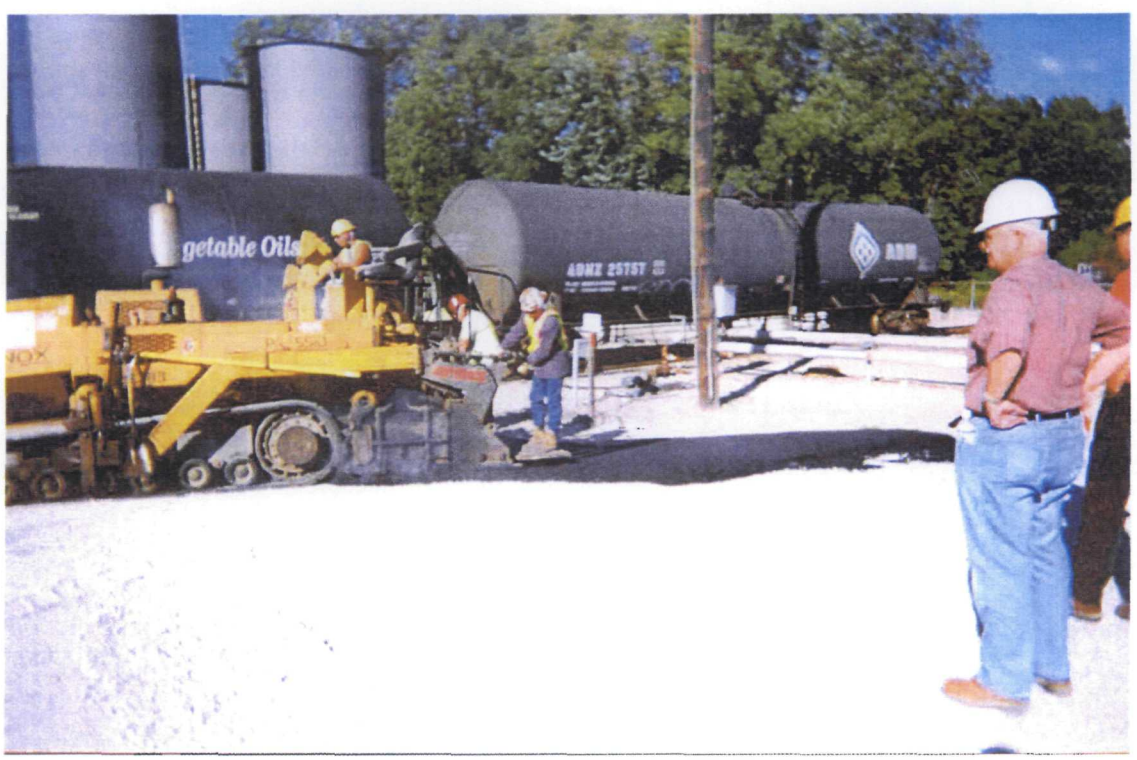
Date:

9/8/2004

Direction:

Looking West

Comments:
Photo 16
Placing pavement along the south edge of the cover area



MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking South West

Comments:
Photo 17
Compacting/rolling pavement (foreground) with ongoing paving (background)

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking North West

Comments:
Photo 18
Pavement progress on south edge of SBPA cover area

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking South West

Comments:
Photo 19
Walsh and Kelly adjusting placement of asphalt with hand tools

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking South

Comments:
Photo 20
Paving around SVE well 79

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking South

Comments:
Photo 21
Walsh and Kelly paving around an SVE well concrete base

Photographer:

Amy Clore

Date:

9/8/2004

Direction:

Looking Southwest

Comments:
Photo 22
Taking asphalt temperature readings

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:
Amy Clore

Date:
9/8/2004

Direction:
Looking South East

Comments:
Photo 23
Clearing large asphalt debris from pavement area

Photographer:
Amy Clore

Date:
9/8/2004

Direction:
Looking South

Comments:
Photo 24
Verifying pavement depth with rod while paving

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking North

Comments:
Photo 25
Grinding cold joint from first day of paving

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking South East

Comments:
Photo 26
Rear view of joint grinding equipment

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

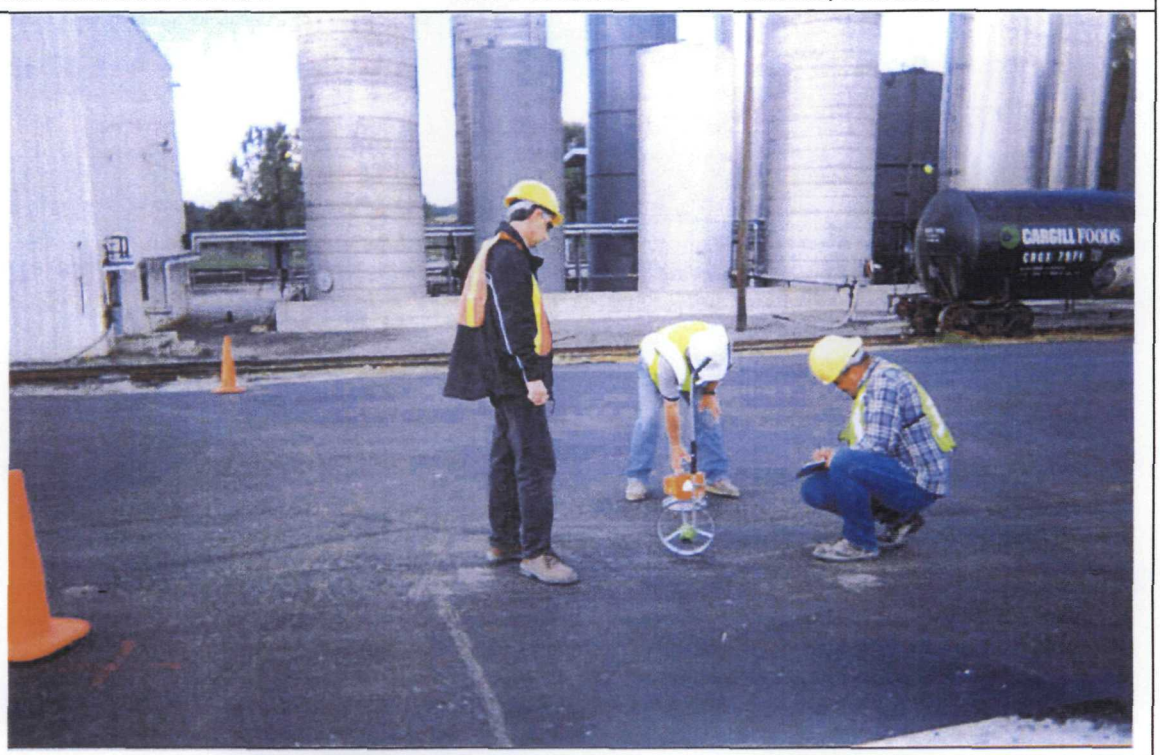
Date:

9/9/2004

Direction:

Looking South West

Comments:
Photo 27
Independent QC contractor performing in-place density tests of September 8th's pavement



Photographer:

Amy Clore

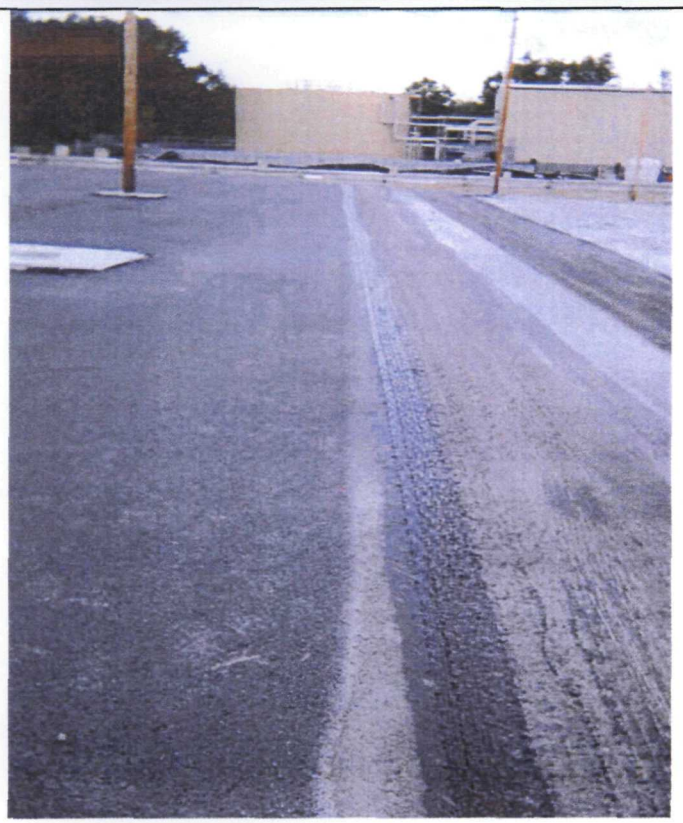
Date:

9/9/2004

Direction:

Looking North West

Comments:
Photo 28
Grinded joint with wet sealant visible along edge



MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking East

Comments:
Photo 29
Paving sloped perimeter on south side of SBPA area

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking North East

Comments:
Photo 30
Placing asphalt pavement by hand around SVE well 84

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking East

Comments:
Photo 31
Walsh and Kelly paving alongside perimeter on south east side on On-site area

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking East

Comments:
Photo 32
Asphalt truck utilizing ACS perimeter gate as exit route

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking North West

Comments:
Photo 33
Concrete pad at SVE 62 after it has been prepared for placement of asphalt

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking South East

Comments:
Photo 34
Independent QC contractor marking test grid onto pavement

MWH

Project:	ACS Final On-Site Cover	Project Number:	2090601
Site Name:	American Chemical Service	Site Location:	Griffith, Indiana

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking East

Comments:
Photo 37
Nearing completion of asphalt cover

Photographer:

Amy Clore

Date:

9/9/2004

Direction:

Looking West

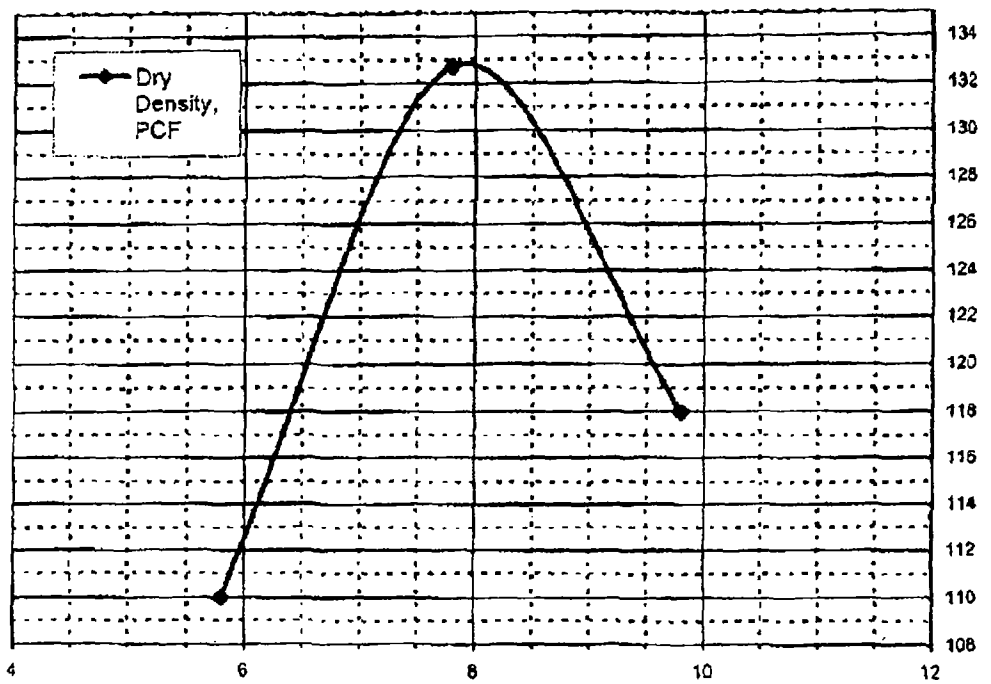
Comments:
Photo 38
Markings made on final cover for areas to be core sampled

APPENDIX C

Gravel Geotechnical Testing Results

midwest engineering services, inc.
geotechnical • environmental • materials engineers
8634 Louisiana Place
Merrillville, IN 46410
219-795-1271
FAX 219-795-1344
www.midwesteng.com

MOISTURE DENSITY RELATIONSHIP
ASTM D - 698



SOIL I.D. NUMBER: 6-45027-01

SAMPLE LOCATION: Sample No. 1

VISUAL CLASSIFICATION: #53 Limestone

MAXIMUM DRY DENSITY, PCF: 133.0

OPTIMUM MOISTURE CONTENT, %: 7.9

Client: Mr. Rich McCarroll
MWH Constructors
175 W. Jackson Blvd., Suite 1900
Chicago, IL 60804

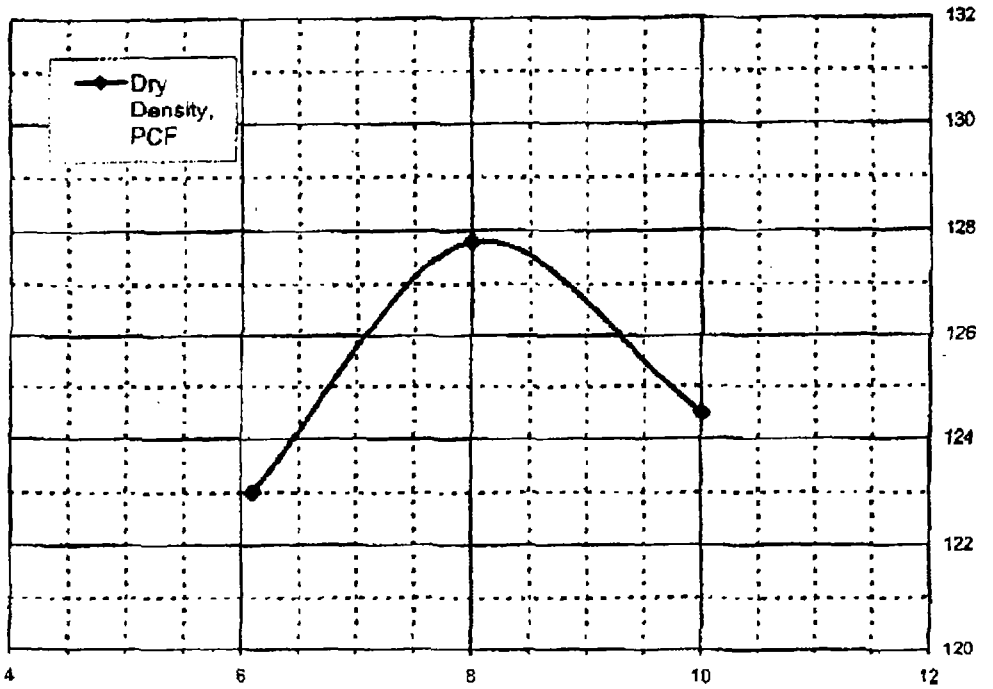
Project: Soil Testing Services
ACS Chemical
410 S. Colfax Avenue
Griffith, Indiana

Date: August 12, 2004

Project Number: 6-45027-01

midwest engineering services, inc.
geotechnical • environmental • materials engineers
8634 Louisiana Place
Merrillville, IN 46410
219-795-1271
FAX 219-795-1344
www.midwesteng.com

MOISTURE DENSITY RELATIONSHIP
ASTM D - 698



SOIL I.D. NUMBER: 6-45027-02

SAMPLE LOCATION: Sample No. 2

VISUAL CLASSIFICATION: #53 Limestone

MAXIMUM DRY DENSITY, PCF: 127.9

OPTIMUM MOISTURE CONTENT, %: 8.1

Client: Mr. Rich McCarroll
MWH Constructors
175 W. Jackson Blvd., Suite 1900
Chicago, IL 60604

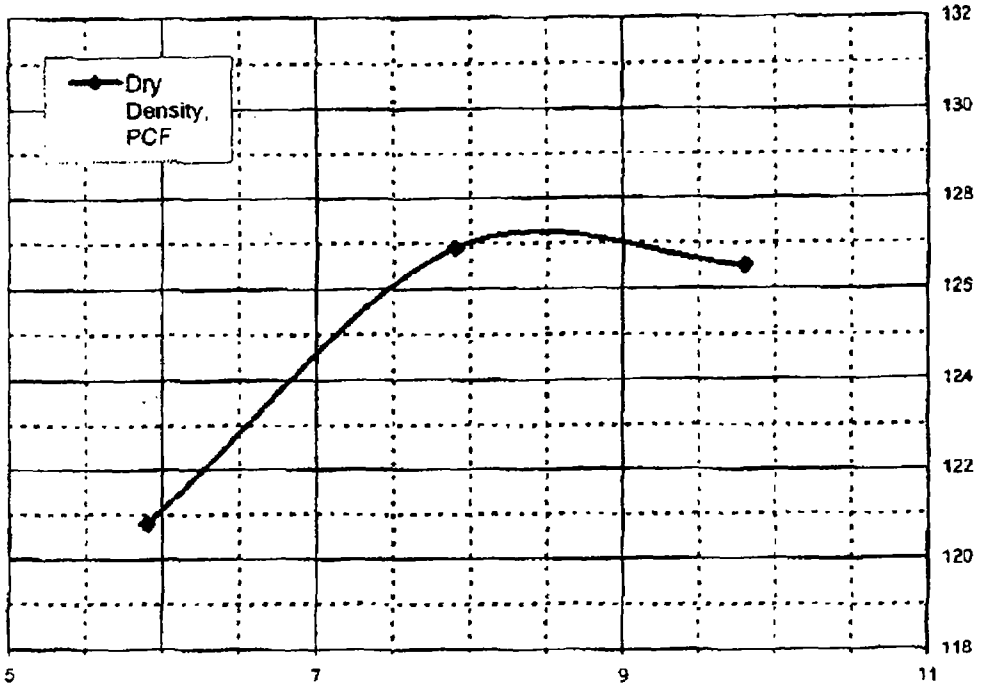
Project: Soil Testing Services
ACS Chemical
410 S. Colfax Avenue
Griffith, Indiana

Date: August 12, 2004

Project Number: 6-45027-01

midwest engineering services, inc.
geotechnical • environmental • materials engineers
8634 Louisiana Place
Merrillville, IN 46410
219-795-1271
FAX 219-795-1344
www.midwesteng.com

MOISTURE DENSITY RELATIONSHIP
ASTM D - 698



SOIL I.D. NUMBER: 6-45027-03

SAMPLE LOCATION: *Sample No. 3*

VISUAL CLASSIFICATION: #53 Limestone

MAXIMUM DRY DENSITY, PCF: 127.5

OPTIMUM MOISTURE CONTENT, %: 8.5

Client: Mr. Rich McCarroll
MWH Constructors
175 W. Jackson Blvd., Suite 1900
Chicago, IL 60604

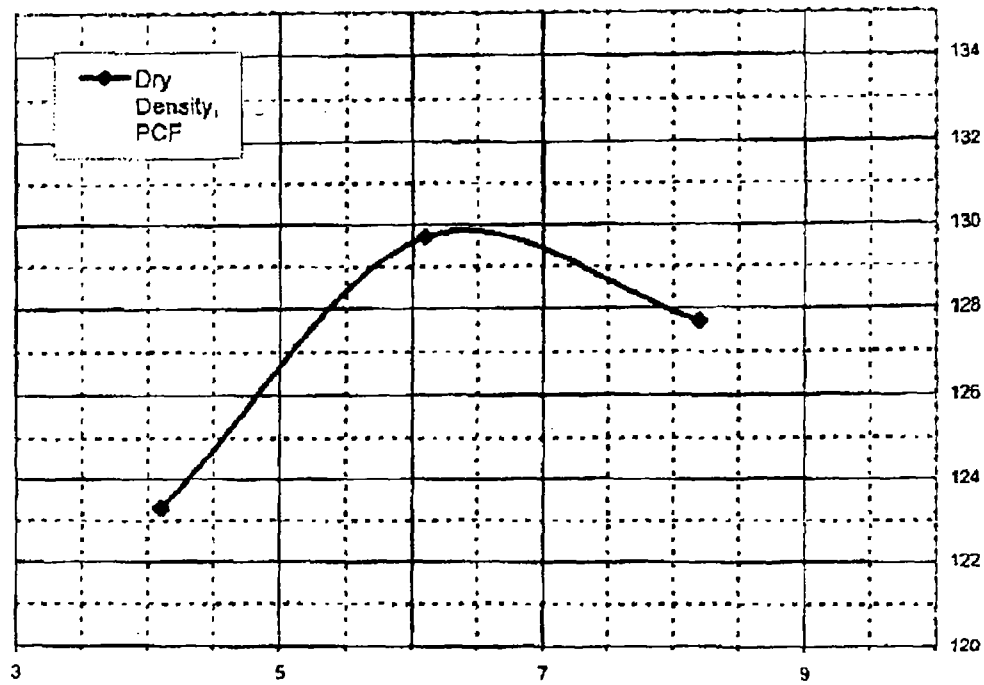
Project: Soil Testing Services
ACS Chemical
410 S. Colfax Avenue
Griffith, Indiana

Date: August 12, 2004

Project Number: 6-45027-01

midwest engineering services, inc.
geotechnical • environmental • materials engineers
8634 Louisiana Place
Merrillville, IN 46410
219-795-1271
FAX 219-795-1344
www.midwesteng.com

MOISTURE DENSITY RELATIONSHIP
ASTM D - 698



SOIL I.D. NUMBER: 6-45027-04

SAMPLE LOCATION: Sample No. 4

VISUAL CLASSIFICATION: #53 Limestone

MAXIMUM DRY DENSITY, PCF: 129.9

OPTIMUM MOISTURE CONTENT, %: 6.5

Client: Mr. Rich McCarroll
MWH Constructors
175 W. Jackson Blvd., Suite 1900
Chicago, IL 60604

Project: Soil Testing Services
ACS Chemical
410 S. Colfax Avenue
Griffith, Indiana

Date: August 12, 2004

Project Number: 6-45027-01

APPENDIX D

Subbase Acceptance Letter

The letter included in this appendix indicates the contractor's approval of the subbase. However, "Accepted" was not circled due to an oversight by the contractor.

WILDER CONSTRUCTION COMPANY

FORM 1
MatCon™ Subbase/Aggregate Base Acceptance Form

Construction Contractor Information

Name: MONTGOMERY WATSON

Contact: LEE M. OROSZ

Address: 410 SOUTH COLFAX STREET

City, state, zip: GRIFFITH, INDIANA 46319

Telephone: 219 924 4607 Fax: 219 924 4561

Aggregate Base Requirements

Yes	No	The aggregate base:	
1. ☑	☐	Extends laterally beyond the edges of the surface to receive MatCon™ by approximately five (5) to ten (10) feet in each direction (or up to a hard paved pre-existing surface)	
2. ☑	☐	Is firm and unyielding when proof rolled by a loaded tandem-axle dump truck	
3. ☑	☐	Has a grade that conforms to the contours of the final MatCon™ surface, less the nominal four (4) inch thickness of the MatCon™ to be installed, for water drainage	
4. ☐	☑	Has a minimum slope of no less than 1.5% and no greater than 3:1 (H:V) with a surface grade tolerance of ± ½ inch	A few areas around gullys do not conform
5. ☐	☑	Is staked for grade and survey control points with grade breaks clearly marked on the finished grade	
6. ☑	☐	Was constructed using soil density vs. moisture content curves established for the material used in this construction – appears to have been - density results attached.	
7. ☑	☐	Was constructed using a calibrated nuclear densometer for field measurements. If yes, who will maintain the data? Attach a copy to this form. – attached.	

Field Density Data Custodian:

Name: G.H. Rowe Firm: Aboaled

Address: 1274 Rt. 113, PO Box 356

City, state, zip Blooming Glen PA 8911

Phone: 215 258 3640 Fax: 772 679 2464 E-mail growe@aboaled.com

Data rec'd from Lee Orosz as above by fax

8. ☐ ☑ Was a survey performed that identifies the surface area prepared and its final contours?

9. ☑ ☐ Did the project OWNER/ENGINEER for the project approve the final subbase surface contours? Approved by Montgomery Watson

What corrective actions, if any, were taken to bring final surface contours into compliance with project plans? Some regrading took place in final work.

PROOF-ROLLING: Locations to be noted on map, survey or site plan

Date performed: _____

Equipment used: _____

Wilder Inspector: _____

not done but surface noted as firm and unyielding.

Notes

1. ***Site Map Attached with:***

   - Field Nuclear Density test locations and results noted (if performed)
   - Surface area included in this inspection specified
   - Locations of proof-rolling marked

2. **Note any necessary corrective action to bring the following items into compliance for acceptance by Wilder Construction Company**

   - Surface area of subbase to be extended 5-10 feet beyond footprint of surface area to be paved with MatCon™
   - Grade tolerance of ± 0.5 inch
   - Firm and unyielding surface conditions
   - Slope is greater than 1.5%, unless previously approved and less than 3:1 (H:V)
   - Grading and survey control stakes are installed and labeled to OWNER/ENGINEER'S satisfaction with grade breaks clearly marked on final surface
   - Structure insertions, pipes, vaults, catch-basins, utility conduits are all installed in subbase grade

3. **Other comments:**

Weed growth avoided over large area of site. This was noted to Walsh & Kelly and Montgomery Watson. Weed spraying took place on 9/8/2004 (and limited on 9/7/2004). Attached letter records Wilders concerns. Letter passed to Greg Hoffman on 9/8/2004 (7:30am) by Geoff Rowe.

Inspected by: G. M. ROWE Initials: [signature] Date: 9/8/2004

Accepted or Rejected by: Patrick G. Turina Date: 9-8-04
(*circle one*)
Print Name

[signature]
Signature

Sr. Project Manager
Title

Wilder Construction Company
1525 E. Marine View Drive
Everett, WA 98201-1927
(425) 551-3100

WILDER

WILDER CONSTRUCTION COMPANY

CORPORATE HEADQUATERS

September 7, 2004

Greg Hoffman
Project Manager
1700 E. Main Street
Griffith, IN 46319

RE: ACS MatCon® Cover Construction
Removal and Treatment of Vegetation

Dear Sir:

Further to discussions with Dr. Geoffrey Rowe last week we confirm that the current inspected condition as inspected today (September 7, 2004) of vegetation growth does not provide a satisfactory solution to the removal and treatment requested – see Figure 1. Based on our inspection today it would appear that vegetation has been cut off at top of grade. We understand some limited "weed spraying" has been undertaken.

We further confirm that the warranty for MatCon® does not extend to vegetation growth in the completed cover. We would strongly suggest that the entire site is treated with an appropriate week killer prior to commencement of paving on September 8, 2004.

Yours truly,

[ORGINAL SIGNED BY PAT TURINA]

Pat Turina
Project Manager

1525 E. Marine View Drive
Everett, WA 98201-1927

Figure 1: Weed growth observed on 8/31/2004

APPENDIX E

Abatech Group Quality Control Report including In-Place Density Testing Results

Appendix E Clarifications

- Page 1, *Quality assurance/quality control activities*, First Sentence: The reference to the ACS Off-Site Final Cover Construction solution should read as '...the ACS On-Site Final Cover Construction solution.

- Page 5, Figure 4: The figure is a graphic representation of the correlation between the asphalt density as indicated by the air void data that was collected from the test pad constructed on September 7, 2004 and the laboratory permeability test results of the core samples collected from the pad. This information was used to establish the relationship between the measured density/air voids and the asphalt permeability.

- Page 5, Table 1: Control Area M2 was placed on September 9 and not September 8.

- Page 6, Table 2: Control Area U2 was placed on September 10 and not September 9.

- Page 7, Thickness of pavement structure, Last Sentence: The average density should read 2.412 and not 2.142.

ABATECH GROUP

1274 Rt. 113, PO Box 1274, Blooming Glen, Pennsylvania, 18911 U.S.A. • Telephone: 1(215) 258-3640 • Fax: +1(772) 679-2464

October 30, 2004

Mr. P. Turina
Wilder Construction Inc.
Project Manager
Wilder Construction Company
1525 East Marine View Drive
Everett, WA 98201-1927

Dear Pat:

RE: Report on Quality Control Activities
ACS On-Site Final Cover Construction

Please find below a report of activities with respect to Quality Control/Quality Assurance for the above project.

Quality assurance/quality control activities
MatCon™ a propriety material developed by Wilder Construction was used as the ACS Off-Site Final Cover Construction solution. Geoffrey M. Rowe, P.E., Ph.D. of Abatech Inc. (an independent firm of consulting engineers), managed the quality control on site on behalf of Wilder Construction. This report has been developed to summarize the quality control activities and to present the results obtained from the testing. PRI Asphalt Technologies performed external laboratory testing, whereas, QC testing was performed by Walsh and Kelly and supervised by Dr. Rowe. All results were reported to Abatech who have compiled an archive record, which will be maintained at their facility.

Pre-construction activities
A facility inspection (MatCon™ guide specification and quality plan) was conducted on August 31st 2004. Meetings were held with plant operators instructing them on the particular quality requirements for the MatCon™ materials.

The mix design was conducted in accordance with MatCon guide specifications. This was completed on August 31st, 2004 and submitted to the project. The design suggested a target binder content requirement of 7.0%. Three specimens compacted to different densities were evaluated for permeability.

Following the mix design a plant trial was conducted and a specimen was evaluated for permeability.

A paving trial was the conducted with the following objectives:

- To familiarize the paving crew with MatCon™ materials
- To evaluate proposed laying compaction procedures
- To assess and calibrate density gauges to be used for quality control during final MatCon™ placement on site
- To ensure that the design can be reliably produced and air void content can be achieved in the field

The completed test strip with locations marked for coring and density testing is illustrated in Figure 1 whereas the density testing operation is shown in Figure 2. During this process it was noted that significant fluctuations in gauge density were obtained due to cooling of the asphalt material. Consequently, the gauge density testing was repeated the following day after the mat had completely cooled along with an additional 10 cores for density verification. During the construction process the final verification of MatCon™ density was conducted 24-hours after placement and was found to be consistent with the final results obtained from the trial pavement area.

Figure 1: Completed test strip at Griffith Airport - location close to ACS Site and Manufacturing unit - with locations marked for density testing and coring

Figure 2: Density testing on test strip location

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Production quality control
During construction testing was conducted in accordance with the MatCon™ guide specifications. All tests have been performed satisfactorily and test data has been archived. The information is not disclosed in this report as this is considered propriety to Wilder Construction Inc. Other records obtained during the manufacturing process have also been archived including:

- Batch production records
- Daily production records
- Delivery tickets for all loads
- Records of temperatures of production for all loads
- Records of visual observations of all loads
- Temperature records for binder storage
- Binder delivery records
- Calibrations of scales and weighing equipment

These records for part of the archive data set maintained by Abatech Inc.

On-site QC activities
On-site QC activities were conducted in accordance with the MatCon™ quality control plan. Two technicians performed these activities under the supervision of Dr. Rowe. The information obtained from this work was as follows:

- Delivery and placement temperature for all loads
- Placement location for all loads
- Density evaluation for 2000ft^2 panels
- Assessment of laid thickness

These records for part of the Archive data set maintained by Abatech Inc.

Field permeability evaluation
During the construction process a density gauge was used to determine the density of the MatCon™ being constructed. Subsequent to paving, after the mat had cooled, five locations were evaluated in a control area representing approximately 2000 ft^2 of completed cover. The density for these five locations was averaged to obtain an average density for each control area (see Figure 3 for each area tested). Using the data obtained from the laboratory mix design, plant verification and the core removed from the final MatCon™ mat, the permeability has been estimated for each section (see Figure 4). These data are presented in Table 1 to Table 3 with the average result reported in Table 4. The results obtained indicate that the average permeability of the MatCon™ cover can be estimated as 1.41×10^{-9} cm/sec.

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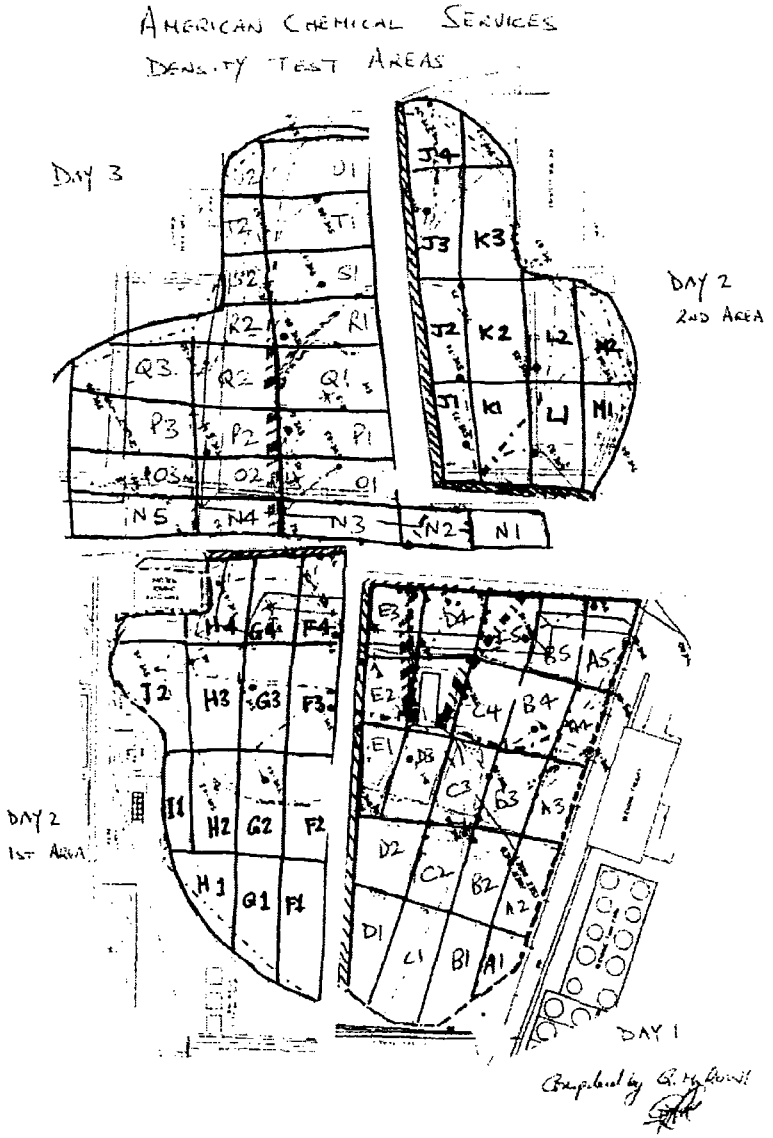

Figure 3: Control areas tested for density during construction of MatCon™ cap

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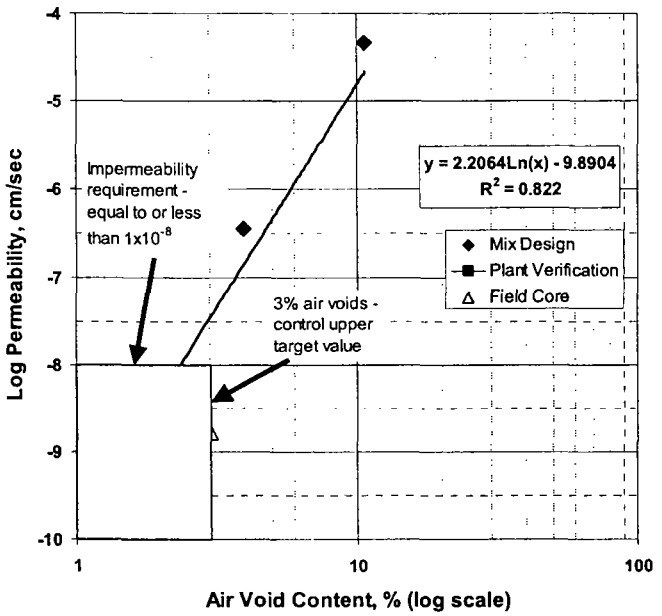

Figure 4: Permeability and air void data of mix design, site trial and site result

Table 1: Day 1 - density and voids content with estimated permeability from laboratory evaluation

Production Day	Control Area	Density	Void Content	Estimated Permeability
		tons/m^3	%	cm/sec
8-Sep-04	A1	2.425	0.7	2.2474E-11
	A2	2.410	1.3	4.8788E-10
	A3	2.423	0.8	3.5231E-11
	A4	2.431	0.4	2.1474E-12
	A5	2.412	1.2	3.7498E-10
	B1	2.423	0.8	3.5231E-11
	B2	2.388	2.2	7.377E-09
	B3	2.412	1.2	3.7498E-10
	B4	2.404	1.6	1.2421E-09
	B5	2.405	1.5	9.9878E-10
	C1	2.412	1.2	3.7498E-10
	C2	2.418	1.0	1.1128E-10
	C3	2.415	1.1	2.1181E-10
	C4	2.405	1.5	9.9878E-10
	C5	2.393	2.0	4.601E-09
	D1	2.415	1.4	6.7507E-10
	D2	2.418	1.3	4.078E-10
	D3	2.401	1.7	1.8712E-09
	D4	2.425	0.7	2.2474E-11
	E1	2.420	0.9	7.8012E-11
	E2	2.420	0.9	7.8012E-11
	E3	2.410	1.3	4.8788E-10
	M2	2.415	1.4	6.7507E-10

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Table 2: Day 2 - density and voids content with estimated permeability from laboratory evaluation

Production Day	Control Area	Density tons/m^3	Void Content %	Estimated Permeability cm/sec
9-Sep-04	F1	2.417	1.3	5.2797E-10
	F2	2.409	1.6	1.6259E-09
	F3	2.412	1.5	1.0678E-09
	F4	2.412	1.5	1.0678E-09
	G1	2.412	1.5	1.0678E-09
	G2	2.412	1.5	1.0678E-09
	G3	2.407	1.7	1.9817E-09
	G4	2.399	2.0	4.8166E-09
	H1	2.388	2.5	1.3479E-08
	H2	2.407	1.7	1.9817E-09
	H3	2.409	1.6	1.6259E-09
	H4	2.409	1.6	1.6259E-09
	I1	2.409	1.6	1.6259E-09
	I2	2.413	1.5	8.534E-10
	J1	2.410	1.6	1.3234E-09
	J2	2.409	1.6	1.6259E-09
	J3	2.410	1.6	1.3234E-09
	J4	2.420	1.2	3.1066E-10
	K1	2.418	1.3	4.078E-10
	K2	2.421	1.1	2.3304E-10
	K3	2.412	1.5	1.0678E-09
	L1	2.413	1.5	8.534E-10
	L2	2.417	1.3	5.2797E-10
	M1	2.413	1.5	8.534E-10
	M2	2.415	1.4	6.7507E-10
	U2	2.409	1.6	1.6259E-09

Table 3: Day 3 - density and voids content with estimated permeability from laboratory evaluation

Production Day	Control Area	Density tons/m^3	Void Content %	Estimated Permeability cm/sec
10-Sep-04	N1	2.415	1.4	6.7507E-10
	N2	2.420	1.2	3.1066E-10
	N3	2.410	1.6	1.3234E-09
	N4	2.413	1.5	8.534E-10
	N5	2.409	1.6	1.6259E-09
	O1	2.417	1.3	5.2797E-10
	O2	2.412	1.5	1.0678E-09
	O3	2.409	1.6	1.6259E-09
	P1	2.401	2.0	4.0814E-09
	P2	2.409	1.6	1.6259E-09
	P3	2.401	2.0	4.0814E-09
	Q1	2.409	1.6	1.6259E-09
	Q2	2.415	1.4	6.7507E-10
	Q3	2.413	1.5	8.534E-10
	R1	2.410	1.6	1.3234E-09
	R2	2.412	1.5	1.0678E-09
	S1	2.412	1.5	1.0678E-09
	S2	2.417	1.3	5.2797E-10
	T1	2.417	1.3	5.2797E-10
	T2	2.409	1.6	1.6259E-09
	U1	2.401	2.0	4.0814E-09
	U2	2.409	1.6	1.6259E-09

Table 4: Mean Density and Voids Content with Estimated Permeability from Laboratory Evaluation

	Density tons/m^3	Void Content %	Estimated Permeability cm/sec
Average Results	2.412	1.4	1.41E-09

Thickness of pavement structure

The coring and quality control measures in place enabled construction of the MatCon™ mat to the required thickness. This can also be assessed by using the quantity of materials produced during the three days of production. A total of 2,969 tons were produced and assuming the average density of 2.142 (see Table 4) and 2.81 acres produced this equates to an average laid thickness of 4.29 inches.

Summary

The data obtained demonstrates that the MatCon™ guide specifications have been met. The necessary testing was conducted in a satisfactory manner with no exceptions to the specification being recorded. Permeability and thickness requirements both met and exceeded the quality required by the specification.

Yours truly,

Geoffrey M. Rowe, P.E., Ph.D.
Abatech Inc.

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APPENDIX F

Core Sample Testing Results

ABATECH GROUP

1274 Rt. 113, PO Box 1274, Blooming Glen, Pennsylvania, 18911 U.S.A. • Telephone: 1(215) 258-3640 • Fax: +1(772) 679-2464

November 10, 2004

Mr. P. Turina
Wilder Construction Inc.
Project Manager
Wilder Construction Company
1525 East Marine View Drive
Everett, WA 98201-1927

Dear Pat:

RE: Lab Data for Permeability Measurements
ACS Off-Site Final Cover Construction

Please see attached reports on permeability. These data have been previously reported in our report of November 22nd 2004. PRI Asphalt Technologies tested the samples "blind". You enable you to decode these results we have provided the cross-reference information below.

Date of PRI Report	Reference on PRI Report	Details for sample	Hydraulic conductivity, cm/sec
9/20/04	10 Blow	10 Blow Lab Mix – test conducted to establish relationship between hydraulic conductivity and air void level	4.6×10^{-5}
	25 Blow	25 Blow Lab Mix – test conducted to establish relationship between hydraulic conductivity and air void level	3.63×10^{-7}
	B	50 Blow Lab Mix – test conducted required level is achieved and to establish relationship between hydraulic conductivity and air void level	3.88×10^{-9}
	E	50 Blow Plant Mix – test conducted required level is achieved and to establish relationship between hydraulic conductivity and air void level. In addition, this verifies the lab design	3.19×10^{-9}
10/12/04	-	Verification core removed from agreed location in MatCon construction	1.65×10^{-9}

We trust this information is satisfactory.

Yours truly,

Geoffrey M. Rowe, P.E., Ph.D.
Abatech Inc.

ASPHALT TECHNOLOGIES, INC.

Test & Evaluation Status Report II

September 20, 2004

REPORT FOR: Wilder Environmental a Division of Wilder Construction Company
1525 E. Marine View Drive
Everett, WA 98201-1927

Attn: Pat Turina, Program Manager via email
cc: Geoff Rowe, PhD, PE via email: growe@abatech.com

Sample ID: MatCon RCRA Cap - Mix Design Cores		**PRI Project #:** MTC 44-02-03/04
Project: American Chemical		**Sampled by:** Geoff Rowe
Sample Date: Unknown	**Location:** Griffith, IN	**Sample #'s:** B, E; 10 Blow & 25 Blow

OBJECTIVE: Evaluate Hydraulic Conductivity of designated cores in accordance with ASTM D 5084 Procedures.

DATA / RESULTS:

PROPERTY	RESULTS, Core ID			
	Rec'd 9/02/04		Rec'd 9/14/04	
	B	E	10 Blow	25 Blow
As Received:				
Height, 0.001"	2.430	2.441	2.713	2.516
Diameter, 0.001"	4.004	3.988	3.987	3.988
Weight, grams. 0.1	1202.0	1207.2	1214.1	1211.2
Trimmed:				
Height, 0.001"	Not Required		Not Required	
Weight, grams, 0.1				
Hydraulic Conductivity, cm/sec	3.88×10^{-9}	3.19×10^{-9}	4.6×10^{-5}	3.63×10^{-7}

DISCUSSION: Cores labeled 10 & 25 Blow did not met the requirements for MatCon Hydraulic Conductivity / Permeability

Analysis Performed by: _____ *Dated:* September 20, 2004
Domingo Callejas, Lead Scientist

Reviewed & Approved by: _____ Dated: September 20, 2004
Kenneth F. Grzybowski, President

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PRI
ASPHALT TECHNOLOGIES, INC.

Test & Evaluation Status Report III

October 12, 2004

REPORT FOR: Wilder Environmental a Division of Wilder Construction Company
1525 E. Marine View Drive
Everett, WA 98201-1927

Attn: Pat Turina, Program Manager via email
cc: Geoff Rowe, PhD, PE via email: growe@abatech.com

Sample ID: MatCon RCRA Cap - Project Core		**PRI Project #:** MTC 44-02-03
Project: American Chemical		**Sampled by:** Geoff Rowe
Sample Date: Unknown	**Location:**	**Sample #'s:**

OBJECTIVE: Evaluate Hydraulic Conductivity of designated core in accordance with ASTM D 5084 Procedures.

DATA / RESULTS:

PROPERTY	RESULTS, Core ID
As Received:	Rec'd 9/27/04
Height, 0.001"	3.361
Diameter, 0.001"	4.002
Weight, grams. 0.1	1647.0
Trimmed:	
Height, 0.001"	2.465
Weight, grams, 0.1	1207.9
Hydraulic Conductivity, cm/sec	1.65×10^{-9}

Analysis Performed by: _____ Dated: October 12, 2004
Domingo Callejas, Lead Scientist

Reviewed & Approved by: _____ Dated: October 12, 2004
Martin R. Burrow, Director of Paving Services

PRI's Accreditations: AASHTO/AAP; NES; ICBO; Metro Dade an ISO/IEC 17025 Lab

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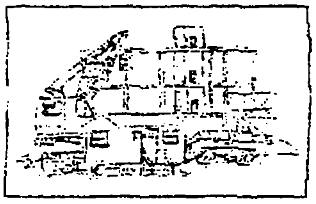
APPENDIX G

Daily Health and Safety Tailgate Meeting Forms

KELLER'S CONSTRUCTION TOOLBOX TALKS



Site Safety—General—An Overview, Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Site Safety—General—An Overview at WALSH + KELLY (company name).

The session covered general site safety awareness and practices.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: 9-8-04 **Job Location:** ACS

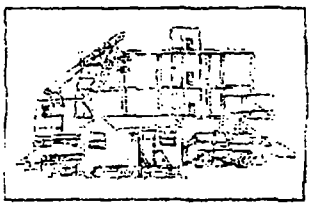
Employee Signature	Print Name Here
[illegible]	Rick McCarroll / Robert Duncan
Amy Clore	Amy Clore
Kimberly K Bueker	K Bueker
Keith VanderWoude	KEITH VANDER WOUDE
Dean Ols	DEAN OLS
[illegible]	Rodney Dittrich
[illegible]	John Strika
Kerry Williams	Kerry Williams
[illegible]	Scott Siedlem
Jim Parker	Jim PARKER

[illegible signature]
Supervisor's Signature

SITE SAFETY—GENERAL—AN OVERVIEW SIGN-OFF–1

NEXT PAGE 1 of 2

KELLER'S CONSTRUCTION TOOLBOX TALKS



Site Safety—General—An Overview, Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Site Safety—General—An Overview at _____ (company name).

The session covered general site safety awareness and practices.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: 9-8-04 **Job Location:** ACS

Employee Signature	Print Name Here
	Doug Grimmer
	Jeff W. Terpstra
	Jim Terpstra
	Robert Gettler
	Tony Deng
	Michael Benko
	Matt Aquino
	George Wallschleager
	Martin Knip
	Terry Thompson
	Pat Turina
	Geoff Rowe
	Greg Hoffman

_____
Supervisor's Signature

KELLER'S CONSTRUCTION TOOLBOX TALKS

Occupational Health—Asphalt Fumes Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Occupational Health—Asphalt Fumes at WALSH + KELLY (company name).

The session covered:

- Overview of topic.
- Hazard descriptions.
- Exposure standards.
- Safety and health information.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: 9-9-04 **Job Location:** ACS

Employee Signature	Print Name Here
LEE OROSZ	LEE OROSZ
Rich McCarroll	Rich McCarroll
Geoff Rowe	
MARTIN KNIP	Martin Knip
Scott Stapelmann	Scott Stapelmann
Robert Perez	Robert Perez
Kimberly G Bunce	KIMBERLY G. BUNCE
Dean Ols	DEAN OLS
Keith Vanderwoude	KEITH VANDERWOUDE
Jim Parkin	JIM PARKIN
Doug Gammeter	DOUG GAMMETER

KELLER'S CONSTRUCTION TOOLBOX TALKS

Occupational Health—Asphalt Fumes Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Occupational Health—Asphalt Fumes at _____ (company name).

The session covered:

- Overview of topic.
- Hazard descriptions.
- Exposure standards.
- Safety and health information.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: 9-9-04 **Job Location:** _____

Employee Signature	Print Name Here
	JIM TERASTRA
	JEFF W. TERASTRA
	Robert T. Gettler
	Dan Rice
	Paul Nantel
	Amy Clore
	Robert Duncan
	Matt Aquino
	Tony Davis
	Cory Hoffman
	Josh Steska

KELLER'S CONSTRUCTION TOOLBOX TALKS

Site Safety—General—Struck-By, Hit-By Hazards Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on *Site Safety—General—Struck-By, Hit-By Hazards* at Walsh + Kelly (company name).

The session covered:

- What is a struck-by, hit-by hazard?
- Various OSHA regulations to illustrate struck-by, hit-by hazards.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: 9-10-04 **Job Location:** ACS

Employee Signature	Print Name Here
	Jose Stanka
	Paul Dittrich
	Tony Bos
Kenny Williams	Kenny Williams
	JIM TERPSTRA
Robert T. Gretzka	Robert T. Gretzka
	Scott Siedelmann
	DEAN OLS
	JEFF W. TERPSTRA
	Dan Rice
	Doug Grimmer

KELLER'S CONSTRUCTION TOOLBOX TALKS

Site Safety—General—Struck-By, Hit-By Hazards Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Site Safety—General—Struck-By, Hit-By Hazards at ______________________ .
(company name)

The session covered:

- What is a struck-by, hit-by hazard?
- Various OSHA regulations to illustrate struck-by, hit-by hazards.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: 9-10-04 **Job Location:** ACS

Employee Signature	Print Name Here
Jim Parker	JIM PARKER
Keith VanderWoude	KEITH VANDERWOUDE
Robert Perez II	Robert Perez II
Kimberly G. Butler	KIMBERLY G. BUTLER
Matt Aquino	Matt Aquino
Scott [illegible]	
Greg [illegible]	Greg Hoffman
[illegible] Robert Duncan	GEOFF ROWE
Tracy A Bevil	TRACY Bevil
Amy Clore	Amy Clore
Richard [illegible]	[illegible]
[illegible]	

2

APPENDIX H
Technical Information on MatCon Asphalt

MatCon

The MatCon™ (**M**odified **A**sphalt **T**echnology for Waste **Con**tainment) system is an advanced modified asphalt technology that combines Wilder Construction Company's proprietary binder with tightly specified aggregates. MatCon Hot Mix Asphalt (HMA) offers unique advantages for environmental capping and containment. Unlike conventional asphalt concrete, MatCon permeability ($<1 \times 10^{-7}$ cm/sec) is lower than that required under RCRA, while also offering resilience and longevity.

These qualities make MatCon a superior containment alternative for environmental applications, particularly when site reuse is an objective. When MatCon is installed as a nominal 4-inch thick cap, a site that once had no value will have a variety of potential alternative uses: parking, equipment storage, truck/train intermodal facilities, and multi-use sports facilities. In these and other ways, a liability on a balance sheet can be transferred to the asset ledger.

MatCon is manufactured in a conventional drum mix or batch asphalt plant that has controls necessary to produce high quality state or federal specification hot mix asphalt pavement material. The hot MatCon binder is delivered in asphalt tanker trucks to the hot liquid storage tanks at the asphalt plant. In most cases the aggregates used in the production of MatCon will be similar to those used in high quality asphalt pavements.

Once the aggregates and the MatCon binder have been heated and mixed, the mixture will be deposited into conventional dump trucks. The MatCon will be hauled to the job site and dumped into a standard asphalt paver, which will lay the material on the prepared surface. Rolling will begin immediately with a vibratory or rubber tired roller and continue until the desired density is achieved. MatCon dense or open graded layers are normally placed four (4) inches deep. This four-inch layer can typically be installed at the rate of one (1), to one and one half (1.5) acres per day.

Wilder Construction Company offers MatCon nationwide in the form of a binder liquid. Aggregate is procured locally, when it meets our rigorous material selection criteria. Wilder preforms a site-specific mix design for every job to insure the compatibility and performance of the materials.

US EPA SITE Program Data

A Table in the draft "SITE Technology Capsule" summarizes the data:

Property	Test Method	MatCon™	Conventional Asphalt
Hydraulic Permeability (cm/sec)	ASTM D-5084	$< 1.0 \times 10^{-8}$	2.7×10^{-4} to 1.0×10^{-5}
Flexural Properties at Center of Beam (mm deflection)	New Method [1]	18.9 No Cracking	31.252 (3 mm wide, 2.5 cm long cracks)
Joint Integrity (cm/sec)	ASTM D-5084	5.47×10^{-5}	1.04×10^{-4}
Load Capacity and Deformation at -20°C (MegaPascals)	ASTM D-4123	2048	3200
Tensile Strength at -20°C (MegaPascals)	AASHTO TP-9	3.55	2.58
Thermal Crack Resistance at 30° C (MegaPascals)	AASHTO TP-10	3.60	2.70
Accelerated Weathering (60 days) (cm/sec)	ASTM D-5084	2.2×10^{-6}	3.15×10^{-4}
Fuel Resistance (Depth of Penetration, cm)	ASTM 1856	1.5	5.5
Void Space (%)	ASTM D-3203	1.53	10.53
Hydraulic Transmissity (drainage layer only) (cm/sec)	ASTM D-5084	8.94×10^{-3}	–

Notes:

1	*Method developed by Ronald Terel of WCC*
2	Cracking was initiated at 7.2mm of deflection
AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society for Testing and Materials

Two types of data were gathered to establish that MatCon surpassed the RCRA Subtitle C water infiltration standard of 1×10^{-7} cm/sec: field data was generated by monitoring volumes of water in a collection sump fed by the central drainage layer of a three-layer MatCon cell during rainfall events and, second, with laboratory testing according to ASTM D-5084, the same test protocol used to evaluate clay liner materials. The SITE Technology Capsule reports that *Field data obtained to date at the Dover and TCL sites indicate that the field permeabilities are 1.22×10^{-8} cm/sec and 4.24×10^{-8} cm/sec, respectively,* exceeding the RCRA C standard. Similarly, all the laboratory evaluation of core samples taken from the two sites showed permeability exceeding this RCRA standard.

The SITE data is especially striking in its comparison of MatCon to conventional asphalt, the EPA concluded that MatCon is *significantly better than conventional asphalt covers in relation to permeability, flexure, load/deformation thermal crack resistance, tensile strength and aging/degradation properties.* The EPA's SITE Technology Capsule summarizes the data in this way:

"A pilot-scale MatCon cover was installed at the Dover site in April, 1999 together with an adjacent conventional asphalt cover for comparative testing. Laboratory testing results indicate that the permeability of the MatCon cover at Dover is less than 1×10^{-9} cm/sec, whereas the permeability of the adjacent conventional asphalt cover is between 5.0×10^{-5} cm/sec and 1×10^{-4} cm/sec. Flexural tests of samples of the MatCon and the conventional asphalt covers indicate

that the MatCon cover can tolerate three times more deflection without cracking compared to conventional asphalt."

MatCon achieves its low permeability by reducing air voids to a level where they do not interconnect. Two photographs of cross-sections of MatCon and conventional pavement, with air voids indicated by fluorescent epoxy, tell the story.

A special bending beam test was developed to demonstrate to measure flexural strength, and thereby evaluate MatCon's ability to conform to underlying conditions such as differential settlement. The data shows that the conventional asphalt specimen began to crack after only eight days and seven mm of deflection. The MatCon beam showed no signs of cracking with 21 mm of deflection after 30 days—the point in time at which the conventional asphalt beam failed. In an independent test extended to 90 days, the MatCon beam deflected a full 30 mm without cracking, this would be tantamount to 1.64 foot deep depression over a 25 foot span, or a 6.56% slope.

When conventional asphalt was first considered as an environmental containment material more than a decade ago it was rejected, in part, because it is to sensitive to temperature changes and thermal cracking. MatCon's superior resistance to low temperature thermal cracking was established using ASTM and AASHTO test protocols. The resistance to thermal cracking was determined by fixing sawed beam specimens of MatCon and conventional asphalt between rigid end platens and gradually lowering the temperature in the chamber. During this test, the stress builds because the specimen is shrinking and eventually breaks. The results show that MatCon is 38% stronger that conventional asphalt at failure and resists cracking until reaching a temperature 8 degrees F lower; this would represent an improvement of two full grades for low temperature performance under the PG grading system.

Another piece of SITE data provides a explanation for MatCon's superior performance in differential settlement and resistance to thermal cracking: MatCon's TENSILE STRENGTH was found to be 1.74 times better than conventional hot mix using the ASTM D-4123.

Thermal cracking is a cold weather phenomenon. Even in temperate climates, aging occurs due to oxidation caused by exposure to air and water. Asphalt molecules increase in size, resulting in hardening and decreased resistance to cracking, raveling and erosion. The SITE program data comparing aging properties of MatCon to conventional asphalt were generated by exposing 4" core samples taken from the Dover AFB installation to ultra-violet light and periodic water sprays over a 60 day period, simulating weather cycles and rain events. As you can see in this chart both MatCon and conventional asphalt exhibit initial stiffening due to structuring or steric hardening. After that, the conventional material begins to deteriorate due to water and air entering the void structure. The MatCon data becomes essentially flat, indicating a stable, unchanging condition.

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